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SPECIAL VHF ISSUE

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

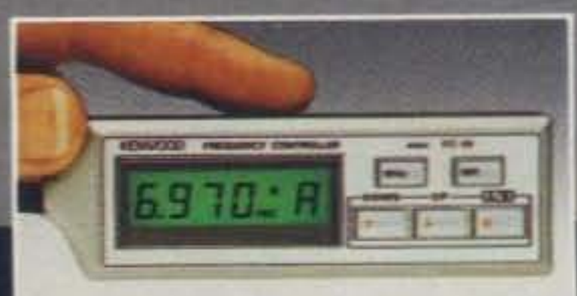
...pacesetter in amateur radio

TM-201A/TM-401A

TM-201A/TM-401A "comp-ACT"... tough act to follow.

The word "compact" best describes the TM-201A VHF (a big 25 watts!) or the TM-401A 70-cm (12 watts) mobiles. Measures 5.6Wx1.6Hx7.2D inches (the TM-201A and TM-401A are the most compact rigs available). Ideal in size, their performances are superlative. Each features a HI/LO power switch, dual digital VFO's built-in, 5 memories plus a "COM" channel with lithium battery back-up, memory scan, programmable band scan, priority alert scan, and GaAs FET RF (front end) amplifiers. They have a highly visible yellow LED digital display, a repeater offset switch, a reverse switch, and a "beeper" to confirm operation of various switches. For superior sound quality, the separate, external speaker, can be easily mounted to project the sound in the desired direction. A 16-key autopatch UP/DOWN mic. allows easy remote operation of major front panel functions. Thanks to KENWOOD, compact radios are now available for the popular VHF and UHF bands providing high performance and superior sound quality

Other TM-201A/TM-401A Optional Accessories:
TU-3 Programmable two-frequency CTCSS encoder, KPS-7A fixed station power supply, MA-4000 dual-bander mobile antenna with duplexer, SW-100A/B SWR/power meter, MC-55 mobile microphone with time-out timer.



Optional FC-10 Frequency Controller
Connects to the TM-201A or TM-401A. Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green LCD display indicates transmit/ receive frequencies, memory channel number, ALERT, and SCAN (with blinking MHz decimal).

TW-4000A

TW-4000A FM "Dual-Bander"
KENWOOD'S TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2-m and 70-cm FM functions in one compact package. It covers the 2-m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, and the 70-cm band (440.000-449.995 MHz), all in a package only 6-3/8 W x 2-3/8 H x 8-9/16 D inches. RF output power measures 25 watts on either band. The TW-4000A features a large, easy-to-read LCD display, front panel illumination for night operations, 10 memories with OFFSET recall and lithium battery backup, programmable memory scan, band scan in selected 1-MHz segments, priority watch function, common channel scan, dual digital VFO's, repeater reverse switch, GaAs FET front ends, rugged die-cast chassis, "beeper" through speaker, a mobile mount, and a 16-key autopatch UP/DOWN mic.

The new optional VS-1 voice synthesizer has everyone talking! A voice announces the frequency, band, VFO A or B, repeater offset, and memory channel number when these functions are selected.

Other TW-4000A optional accessories:
VS-1 voice synthesizer, TU-4C programmable two-frequency CTCSS encoder, KPS-7A fixed station power supply, SP-40 compact mobile speaker, SP-50 compact mobile speaker, MA-4000 dual-band mobile antenna with duplexor, MC-55 mobile microphone with time-out timer, and a SW-100B SWR/power meter.

More information on the TM-201A/TM-401A and TW-4000A is available from authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street Compton, California 90220.

Specifications and prices are subject to change without notice or obligation.

KENWOOD

pacesetter in amateur radio

TS-430S "Digital DX-terity!"

TS-430S

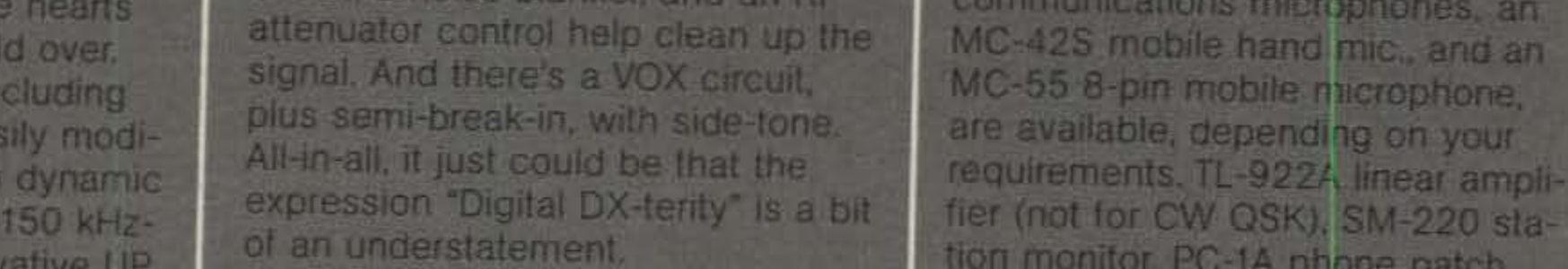
Digital DX-terity...that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.

Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories:
In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own", the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160~6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.



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ICOM's IC-02A

Digital Readout, Scanning, Memories and...

ICOM introduces the new top-of-the-line IC-02A and IC-02AT to compliment its existing line of popular handheld transceivers and accessories. The new direct entry microprocessor controlled IC-02A is a full-featured 2-meter handheld.

Some of its many features are: Scanning, 10 memories, duplex offset storage in memory, odd offsets, 32 keyboard selectable PL tones which store in memory, and internal lithium battery backup

Keyboard entry through the 16 button pad allows easy access of frequencies, duplex, memories, memory scan, priority, dial lock, PL tones and DTMF in the IC-02AT.

An easy-to-read custom LCD readout indicates frequency, memory channel, signal strength and transmitter output, PL tone, and scanning functions.

The new IC-02A has a battery lock, frequency lock, and lamp on/off switch. An aluminum case back is provided for superior heat sinking when the IC-02A is run at the standard 3 watt level or 5 watts (optional battery pack).

A variety of batteries are available for the IC-02A and IC-02AT, including the new long-life 8.4 volt IC-BP8 and 13.2 volt IC-BP7. The IC-BP7 and BP8 may be charged from a top panel connector for 13.8 volts which will also power transceiver operation.

ICOM's IC-2A(T) continues to be available...and its complete line of accessories work with the new IC-02A.

The IC-02A comes standard with IC-BP3 NiCd battery pack, BC-25U wall charger, flexible antenna, wrist strap and belt clip.

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ICOM

The World System

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 02AT2

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CQ The Radio Amateur's Journal

ON THE COVER: The photographer gets photographed! Larry Mulvehill, WB2ZPI, who takes most of the cover shots for *CQ* and sister publication *Popular Communications*, is caught in the act of operating 2 meter f.m. and 20 meter s.s.b. *alfresco* in upstate New York.

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Zero Bias

AN EDITORIAL

Dayton '84 is just a memory now, but what a memory. It was perhaps the best one ever, with everything working towards a magnificent time for all. The weather was atypical, in that you couldn't have asked for better conditions: everyone seemed to have a positive attitude, the police traffic enforcement had a cooperative spirit this year, and you really had to go out of your way to have a bad time.

The fleamarket opened early Friday morning, so the commercial exhibitors had several hours to browse before their exhibits opened at noon. Once the doors opened to the public, it was virtually impossible to get out for the three days, since it was just that crowded. Several people came up to me and said that they took my advice and came out to a hamfest to see what was going on. Dayton may be unique in size, but you still have just as much fun as at a local event. Try it at least once this year.

The DARA group should be congratulated on their massive effort to give amateur license examinations at the hamfest. Even those who proctored the exams had to attend classes in procedures. It was a tribute to organization and a "can do" attitude. On a somewhat down side, the failure rate for the exams was high, which I think caught most people by surprise. One would think that since the exams were scheduled in advance, people would have had time to study and psych themselves for this occasion, arriving prepared. I don't have the answer or any particular reason for the failure rate. I just hope it isn't an omen for the future. Amateur radio needs all the new amateurs it can get.

It's Happening All Over

Not only is amateur radio feeling the impact of budget crunch, but those holding commercial licenses soon will be out in the cold, too. Some of you have both amateur and commercial licenses, and some of you may be thinking of a career in broadcasting. Here's how one organization plans to handle the situation. The following information was supplied by Jay Kitchen, president of NABER.

At its open meeting on February 24, 1984, the Federal Communications Commission voted to eliminate the requirement that a techician hold a General Radiotelephone Operator, First Class, or Second Class License (a "commercial" license) to install, repair, and maintain transmitter equipment. The Commis-sion's order affected the following radio services: Private Land Mobile and Fixed, Personal, Domestic Public Fixed, and Cable Television Relay. The order will go into effect 180 days after the release of the Commission's official Report and Order.

At the same time that it eliminated the license requirement, the Commission responded to the large number of reply comments which were filed during the period of its Notice of Proposed Rulemaking which was released in May 1983. In order to emphasize that the servicing of transmitter equipment should be performed by *qualified* technicians certified by organizations representing users in the affected Services, the Commission modified its proposed rule changes. It endorsed and encouraged organizations such as the National Association of Business and Educational Radio (NABER) to establish an industry certification program for technicians.

Anticipating the FCC's decision to eliminate the license requirement despite numerous and vocal land mobile opposition which NABER itself has lead, the association announced its Technician Certification Program in early February at M/C Expo in Anaheim, California.

In March, the Technician Certification Advisory Board met in Orlando, Florida. Representatives from industrial, public safety, manufacturers, and railroad user groups, and others outside the immediate NABER constituency met with officials representing land mobile radio and fixed microwave manufacturers, dealers, service shop operators, technicians, and technical schools.

In April at the National Land Mobile Expo in Denver, Jay Kitchen, NABER's president, announced that the deadline for the Technician Certification Program's first phase, a "grandfathering" program, had been extended in response to an unprecedented number of inquiries about the program. As of April 30, 1984, the original deadline for the program, NABER had received nearly 17,000 completed applications from commercial license holders.

For those persons currently holding a General Radiotelephone Operator, First Class, or Second Class License and applying prior to *July 31, 1984*, NABER is waiving the examination requirement as a prerequisite to certification. Those applicants need only photocopy their FCC license, noting former First Class status if it was held, complete a Technician Certification Application for Exemption Program form, and send both, along with a check for $10.00 to cover the costs of the program, to be grandfathered into the program for a renewable period of five years.

In order to receive an application and further information about the program and the examination NABER will begin administering in the fall, call John Sherlock, the certification program coordinator at (202) 887-0920.

73, Alan, K2EEK

In Memorium

"Perry" Ferrell (1920-1984)

It is with sincere sorrow that we report the death of Oliver "Perry" Ferrell, former Editor of *CQ* magazine. Perry was fatally injured in an automobile accident the night of April 21st.

Perry got started in radio as a teenager in 1935, and shortly thereafter his byline began appearing on numerous stories in communications periodicals. Over a long career it was his byline which was eventually to show up on more than 400 stories and editorials.

When WW II broke out, Perry became a radio propagation consultant to the American military forces. This included being smuggled behind enemy lines in order to do preliminary planning for the communications system which would be required during the construction of the Burma Road. In March 1946 Perry joined the staff of *CQ* magazine as a contributing editor, and not long after he was made the Assistant Editor of *CQ*. In late 1951 Perry took over the editorship of *CQ*, holding that position until late 1954. During his term as Editor of *CQ* he made significant changes in the magazine's format and content, including the commencement of the first RTTY column to appear in an amateur radio magazine.

Upon leaving *CQ*, Perry became the founding Editor of *Popular Electronics* magazine and remained with that publication, and its sister magazine, *Stero Review*, for many years. Perry retired from the magazine business in the 1970s and devoted his energies to his own company, Gilfer Associates. Gilfer eventually became well known as a major dealer in communications receivers and as a publisher of communications and s.w.l. books, including the *Guide To RTTY Frequencies* and *The Confidential Frequency List*.

Perry was a member of The Radio Club of America and was a noted authority on radio propagation, the technical aspects of communications equipment, and DXing.

Those of us who had the privilege of knowing Perry were always impressed by his in-depth knowledge of matters concerning communications, and most especially his way of discussing these matters in a style usually peppered with his unique wry wit. We will miss Perry, as will the many friends he made throughout the decades in which he was closely involved in the many areas of communications. Our condolences are extended to his family.

Walt Burdine, W8ZCV

We finally got the phone call that we had been expecting for a very long time. Walt Burdine, W8ZCV, had passed away. The news, although expected, still came as a surprise and was saddening. Walt was our Novice Editor for many years, and he delighted in both amateur radio and helping those aspiring to become amateurs. His philosophy was homespun and gentle. He always had time to operate, to help, to teach, and especially to smile. We'll miss you, Walt.

Bob Zimmer, K4JZB

I met Bob several years ago at a hamfest in Florida where he talked about doing an article for *CQ*. Since then Bob's "Zimbeam" articles have appeared in *CQ* and have met with very favorable responses. This past April we ran the latest one, and shortly after it was published we learned of Bob's sudden passing. Our sympathies to Mrs. Zimmer and the Zimmer family.

Say You Saw It In CQ

hy-gain®

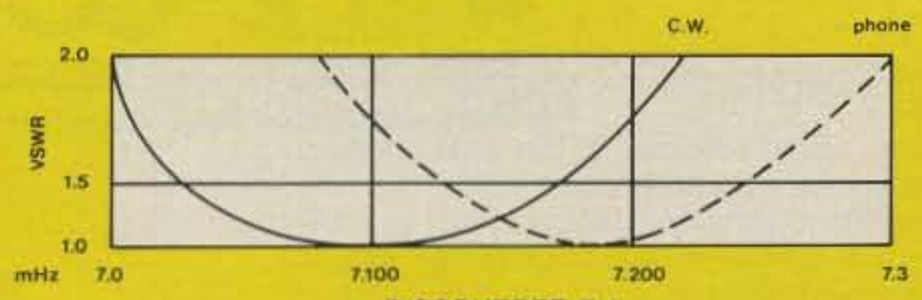
Rediscover 40 meters with the DISCOVERER SERIES Rotatable Dipole or Monoband Beams

This 40 meter antenna series gives you three choices. The Discoverer 7-1 which is a rotatable dipole. Or the Discoverer 7-2, a two-element beam you can upgrade to three elements with a kit.

Whichever you choose, you'll get Hy-Gain's superior mechanical design. Such as tapered tubing to reduce weight and wind surface area. Maintenance-free stainless steel hardware and preformed clamps for an easy, rugged assembly.

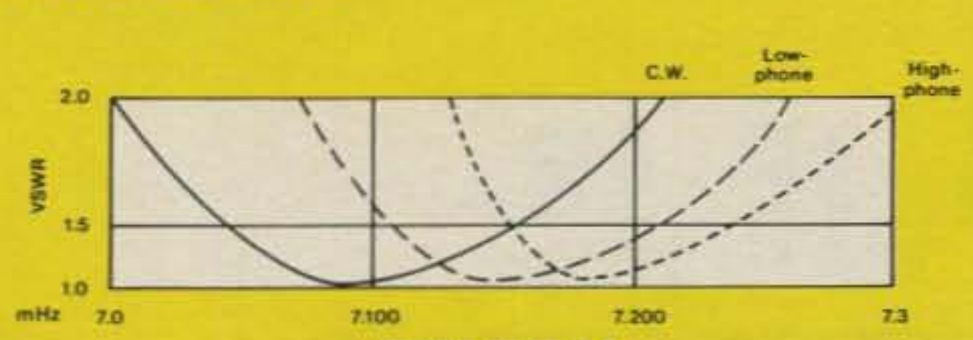
You also get superior performance. Wide bandwidth with SWR of 1.5:1 or less at resonance. High-Q efficiency because there are no high-loss coils. A low voltage feed point that eliminates insulator failure and assures that the antenna can handle twice the new legal power limit.

The Discoverer 7-1 dipole can be added to most existing rotatable beam installations. This model can be tuned to either 30 or 40 meters.

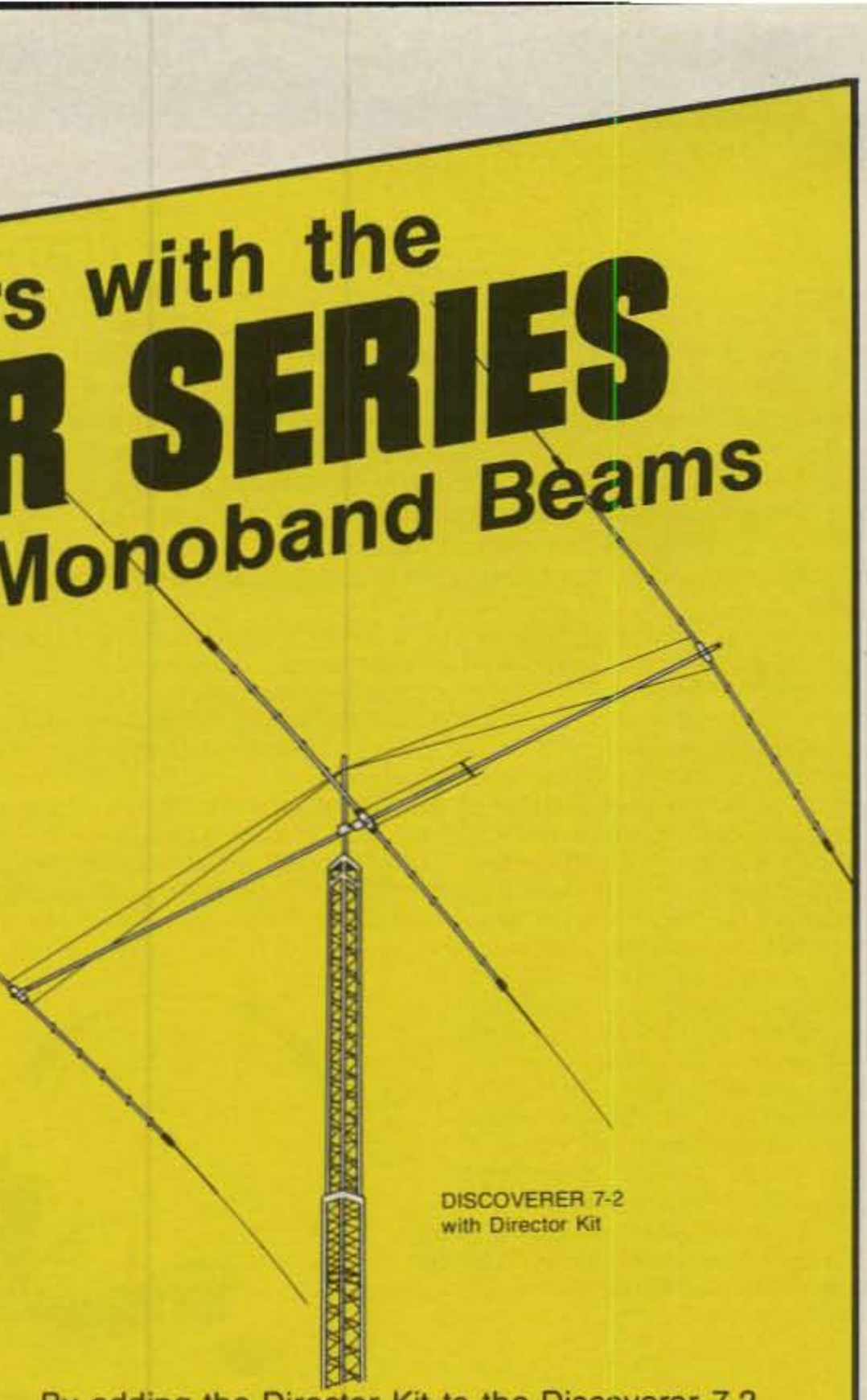


DISCOVERER 7-1

The Discoverer 7-2 requires only a 25 ft. (7.6 m) turning radius and opens communication doors you previously thought possible only on 20 meters. Combining the advantages of high forward gain and a high front-to-back ratio lets you hear and work stations you couldn't read on a dipole or vertical antenna. Best of all, you can upgrade this antenna anytime with the 373S Director Kit.

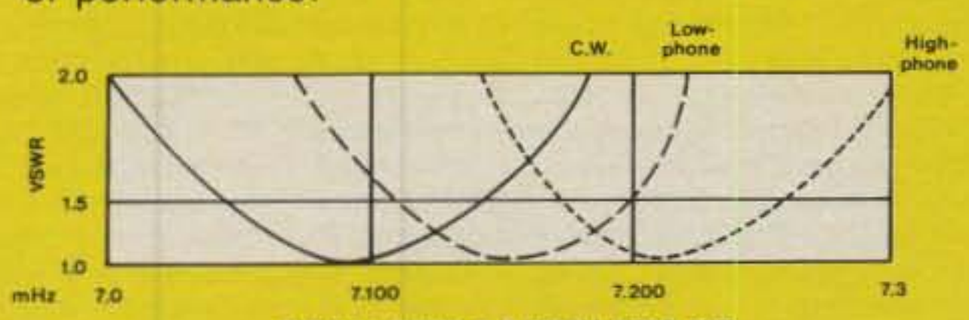


DISCOVERER 7-2



DISCOVERER 7-2 with Director Kit

By adding the Director Kit to the Discoverer 7-2 you create a three-element beam on a boom of only 35 ft. (10.7 m), that outperforms many of the heavy-weight giants with much longer booms. In fact, the kit doubles the effective radiated power of the Discoverer 7-2, and nearly doubles the front-to-back ratio. And, because the antenna is still more compact than a "giant", you only need a medium-duty tower such as the HG52SS. All of which saves you money and space without compromising safety or performance.



DISCOVERER 7-2 WITH 373S KIT

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SIMPLY SMARTER HANDHELDS

144 MHz • 220 MHz • 440 MHz

Smart enough to be user friendly means the newest Santec radios are more useful in your hands. Without sacrificing features and functions you really want, you can have an easier to use, yet smarter handheld from the broad line of models for the most popular VHF and UHF bands 144, 220, and 440 MHz. Plenty of accessory items are available for the Santec radios to make your personal application of Santecnology (TM) the smoothest yet. And don't forget the transistor and semiconductors in all Santec products are guaranteed for two full years.

Santec's smarter handhelds help the user by providing widest frequency coverage for MARS and CAP operations as well as amateur radio. Any value of offset on 10 KHz steps can be set and stored in any memory location, thus requiring only one memory per transceive frequency pair. Single stroke memory recall of all 10 memories and the required offset means no more switch flipping when repeater frequencies are changed. Because lower power output from the transmitter helps the user to get longer service times on each battery charge, Santec provides three switchable power levels from the full power level of 4 watts plus down to a midrange of around one watt and a battery conserving 100mw. The Santec user gets plenty of helpful information from the complete display on the large size LCD frequency display using six digits plus the offset direction and memory number. Mode of scan, PLL lock and the receiver and transmitter indicator are all usable at the same time without any extra effort. All the neat features you expect plus a good, solid performing transceiver section with excellent sensitivity and high quality audio make Santec your best choice for a handheld transceiver.

For specifications and a full catalog of Encomm, Inc. products send us a QSL. Specifications subject to change without notice or obligation. Information in this ad does not constitute warranty.

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THE WELZ CORPORATION LINE OF STATION ACCESSORIES

WELZ specializes in WATTS. Measuring Watts and switching Watts, radiating Watts and dissipating Watts is what the WELZ line of winners is all about. Welz is the source for top quality, superior performing, affordable products to compliment your mainframe radio equipment from any source. Increase the versatility of your measuring capability with WELZ WIDE-Z Sensor (TM) power and V.S.W.R. meters, precision 50 ohm terminations. Conserve your coax dollars with the dual band Diamond Antennas for 144/430-440 MHz for base and mobile applications. Welz dual band duplexers let you feed two antennas on two different bands with one feed line with no switching or two transmitters onto one dual band antenna simultaneously. WELZ has wattmeters and V.S.W.R. bridges from 200 mW to 2000 Watts from 500 kHz to 500 MHz frequency range. When you need to measure in RF Watts WELZ has a winner for you. The full line of Wattmeters encompasses many different models, some of which are shown in this family portrait. In addition to both in-line and terminating type wattmeters the WELZ line of Winners includes several high quality dummy loads for testing and tuning plus applications requiring precision 50 Ohm terminations. Frequency ranges of the WELZ loads are typically wider than similarly priced items from other sources. WELZ has winners in the economy circle also. The performance value of the economy line of Wattmeters from WELZ is really superior. The instruments from WELZ are extremely well built and very easy to view. The portable units such as the SP-10x and the SP-380 provide reliable service in the field as well as in the fixed station. Send QSL type card for complete catalog of WELZ products.

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FM-2033

2m 25W Mobile Maxpack

- Liquid Crystal Display with soft orange lighting for direct sunlight viewing plus night viewing.
- Repeater Offsets (+, −, S) Stored in memory along with the frequency information.
- WIDE frequency coverage for MARS and CAP capability (142-149.995 MHz)
- New chrome front with soft pearl gray cabinet for today's auto decor.
- Memories with valid data scanned, blanks are skipped.
- Repeater reverse switch for monitoring repeater's input frequency.

Coming Soon
50 MHz—FM-6033
440 MHz—FM-7033
220 MHz—FM-4033

The KDK FM-2033 represents a significant advance in user convenience and simplicity of operation for the user. The KDK '33' series provides excellent readability in any lighting condition for the operating frequency and the memory channel in use. Warm orange background LCD displays improve readability by providing easy-on-the-eyes contrast.

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The FM-2033 provides a clean 25 watt output signal across 142–149.995 MHz to operate in balance with most repeaters and provide quieting for simplex operations. MARS (Navy too!) and CAP frequencies are also accommodated even with their unusual repeater splits.

You want convenience, reliability and easy operation for your mobile station and a tough-to-beat dollar value, right? Then check out the FM-2033 at your local dealer TODAY or send QSL for specifications. We think you will want one for yourself.

Specifications are nominal and are subject to change. All KDK transceivers meet or exceed FCC regulations regarding spurious emissions.

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Our Readers Say:

Learn From Others

Editor, *CQ:*

Having been a ham for four years now, I would like to take this opportunity to advise Novices and would-be hams not to make the same mistakes I made when purchasing equipment. When considering what type(s) of gear would be best suited to your needs and financial situation, PLEASE enlist the advice of an older or more experienced ham (preferrably one with a higher class license than your own) before even *thinking* of making a selection. I know, because if I had sought the guidance of a veteran amateur when I was a Novice, it would have saved me a lot of money, frustration, and wasted time later on.

Of course I know what it is like to want very badly to get on the air immediately after obtaining that first ticket! But because of my impatience, ignorance, and unwillingness to learn from the wisdom of others, I wasted a lot of money and time on gear that was either worn out or obsolete, or unsuitable for amateur use.

So now that you've discovered the fascinating world of amateur radio, take the time to find out what equipment will best serve you and yield many hours of enjoyment in the hamshack.

Tim Forlines, N8FFY
Bluefield, WV

We'll Pay A Price

Editor, *CQ:*

It is ironic indeed that your February 1984 issue heralded the end of "no-code," its possible tie-in with the new Volunteer Examination Program in your Zero Bias editorial, and the revelation by Joyce Davila of the FCC that the princely sum of $96,000 will be saved by eliminating direct FCC testing for ham licenses.

I was certainly an ardent foe of "no-code," but if the VEP was the price we had to pay, it was a high price indeed. Not only will hams around the nation be spending a considerable amount of time, effort and non-reimbursable expenses on the expanded volunteer examination program, but now the American taxpayer—quite rightly, in my view—will pick up the reimbursable expenses of the VECs.

Added to that are the inevitable costs to the FCC of maintaining quality control over volunteer examinations for the long run.

All of this makes me even more suspicious of the "deregulation fever" and the uncritical acceptance of the simplistic "free-market" and privatization nostrums spouted by public figures these days. Too bad it extended even into our own little area—ham radio licensing. We are likely to pay a heavy price in both direct costs and externalities, without addressing the need—as you indicated in your editorial—of making ham radio more relevant to the educational and technological environment of the 1980s.

Fred Heutte, W3XY
Portland, OR

From An Accomplished QRPer

Editor, *CQ:*

Thanks for the renewal note! I am pleased to say I'm renewing for another three years.

As a QRP enthusiast *(see this month's QRP column for more about Ron's accomplishments—ed.)* and having been awarded trophies No. 28 and 53 with SSB No. 7 and both modes No. 2, I enjoy any and all QRP articles by Ade Weiss, WØRSP. We have had on-the-air QSO's as well as telephone or landline QSO's.

I usually participate in the contests, but can never seem to get a totally free weekend for just contests. *But* I do have intentions to send in a log or two in the future.

All of the articles in *CQ* are very good. I enjoy good old basics now and again for a refresher, and that also helps the newcomer. There is less free time to build like I use to, but the projects are a welcome relief from the daily pressures.

I could go on and on, but you're busy, and I don't want to miss getting this renewal in the mail. I hope all at *CQ* keep up the good work. The way it has been going, I'm sure I won't be disappointed!

Ron Morais, KF1H
Yarmouth, ME

RFI Strikes Again

Editor, *CQ:*

I am relatively new to amateur radio and am bothered by an RFI problem which probably isn't new to more experienced hams. There are several CB operators in my area who continually create AM interference on the CW portion of the 10 meter band. Apparently, their radios have been tampered with (they also operate out of band) to the extent that they are producing harmonics which fall in the 28.034 to 28.375 MHz range. As they transmit within their legal channel allocations, I'm copying their harmonics at S9 plus on 10 meters.

Countless times I've had to abandon great QSO's, some of them being choice DX. Have you any recommendations as to how this problem might be solved? Would it really do any good to bring it to the attention of the FCC? After trying several antenna designs and filtering techniques, the problem still comes blasting through. I can't tell you how tired I am of hearing "Tubby" say "Ten-four."

Tom Cheney, N2EOW
Watertown, NY

Please send all reader inquiries directly.

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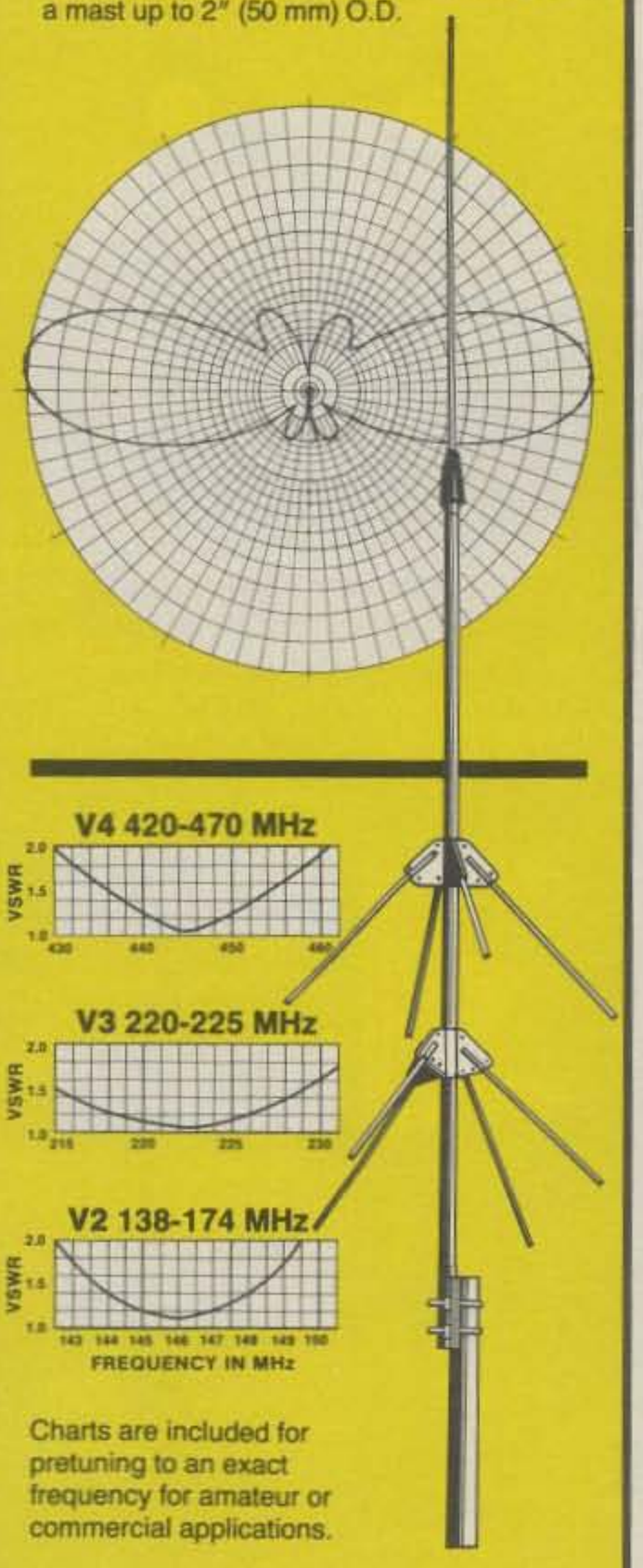

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Please send all reader inquiries directly.

Announcing

● **Louisiana Amateur Radio Exhibition** - LARE, a nonprofit corporation, was formed by amateurs to provide an amateur radio exhibit at the Louisiana World Exhibition, which began on May 11 and will continue until November 12, 1984. All contributions to help with the expenses of maintaining this exhibit would be greatly appreciated by LARE. For more information on the exhibit and how clubs and individuals can contribute, contact John Uhl, KV5E, President, LARE, Inc., 100 Robert E. Lee Blvd., New Orleans, LA 70124.

● **W9OG Special Event Station** - The Tri-State ARS will operate club call W9OG from June 30 through July 4 from 10 a.m. to 5 p.m. CDT in the lower portion of the Novice and General segments of the 10 through 80 meter bands, all modes, including RTTY. A QSL will be available for contacts (include 20¢ postage), and a certificate for $1.00. Send QSO information to TARS, Special Event Station W9OG, Att: M.G. Anderson, P.O. Box 3284, Evansville, IN 47732.

● **W23PRI For The Olympics** - Special event station W23PRI will operate from July 1 to August 31 from Cupertino, CA, to commemorate the 23rd Olympiad. Times and dates (in UTC): Tues–Fri. 0000–0030 on 7050 kHz (all freqs. are in kHz), 0030–0100 on 7110, 0100–0130 on 14050, 0130–0200 on 21110; Sat. 1400–1430 on 21060, 1430–1500 on 21110, 1500–1530 on 14050, 1530–1600 on 7050, 1600–1630 on 7110; Sun. 2000–2030 on 21060, 2030–2100 on 14050, 2130–2200 on 7050, 2230–2300 on 7110. QSL for s.a.s.e. to 18954 Pendergast Ave., Cupertino, CA 95014, or via W6 QSL Bureau for non-USA stations.

● **Smoky Valley ARC Special Event** - This club of Junction City, KS, will operate a special event station from 1130 UTC July 4 to 0500 UTC July 5 on all bands 10–160 around 15 kHz up from the bottom of the Novice and General parts of the bands, c.w., s.s.b., and RTTY (no call given). For a certificate, send large s.a.s.e. to SVARC, P.O. Box 143, Junction City, KS 66441. A certificate will also be awarded for contacting any club member from July 1 through Sept. 30.

● **Special Event Station WD4GPO** - The Pioneer ARC of Winchester, KY, will operate this special event station in the General and c.w. portion of the bands, with some Novice operation, to commemorate the annual steam engine convention. A special QSL will be available for an s.a.s.e. sent to Pete Clough, WD4GPO, 425 Bell St., Paris, KY 40361.

● **WA8MTX From Monroe, MI** - The Monroe County Radio Communications Assn. will operate WA8MTX during the Floral City Festival on July 13 and 14 in the General portion of the bands, including c.w. and RTTY, from 1300–2100Z. Send QSL and business-size s.a.s.e. for a certificate to Bob Keenan, KD8IW, 3083 6th Street, Monroe, MI 48161.

● **Eastern Michigan ARC's K8EPV** - K8EPV will commemorate the annual Port Huron to Mackinac Island Yacht Race on July 14–15 from 1400–0200Z both days on 3910, 7235, 14235 phone; and 3710, 7110, 21110 c.w. For a certificate, send QSL and s.a.s.e. to K8EPV or 654 Georgia, Marysville, MI 48040.

● **Space Day Certificate** - The Cascades ARS, in conjunction with the Michigan Space Center in Jackson, MI, is offering a Space Day certificate to all stations who work WB8CSQ. Look for WB8CSQ on 3.900, 7.235, 14.285, 21.360, and 28.510 from 0000 GMT July 14 through 1700 GMT July 15. For a certificate, send $1.00 and log information to CARS, Space Day '84, P.O. Box 512, Jackson, MI 49204.

● **W8TQE From Michigan International Speedway** - The Adrian ARC will operate W8TQE on July 20–22 on 28.625, 21.360, 14.240, 7.240, 3.900 plus or minus QRM. Novice bands up 10 kHz on 21.110, 7.110, 3.710. A certificate will be offered for a large s.a.s.e. sent to Adrian ARC, P.O. Box 26, Adrian, MI 49221.

● **W8JPW From Warren, MI** - The Tank-Automotive Command ARC will operate this special event station on July 21 from 1300–2000Z on phone 7.274, 21.400, 146.49 MHz; c.w. 7.055 from 1500–1700Z. Send s.a.s.e. for certificate to W9JPW, US Army Communications Command, Att: CCNC-TAC-M, 28251 Van Dyke, Warren, MI 48090 (put their QSO number and freq. in upper left corner of outer envelope).

● **TK@MWC From Strassbourg, France** - This station will operate from the 11th Mennonite World Conference from July 24–29 on s.s.b. 3680, 7080, 14280, 21380, and 28885 kHz. For QSL and/or more information, contact PA@HEL, P.O. Box 639, 2600AP Delft, The Netherlands.

● **W8UMD From Greenville, OH** - The Treaty City ARA will operate the Annie Oakley Special Event from 1400Z July 28 to 0200Z July 29, and 1400 to 2200Z July 29 on 3910, 7235, and 14285 kHz. For certificate send s.a.s.e. to TCARA, P.O. Box 91, Greenville, OH 45331.

● **Wayne and Piute Counties, Utah** - W7YS and WA7NXL will operate portable from these counties during the CW County Hunters Contest, 0000Z July 28 to 0200Z July 30 using the regular contest frequencies on 80–10 meters. Before the contest they will operate on the Novice bands and 30 meters for those needing Utah for WAS. QSL W7YS via 1400 N. Wakonda, Flagstaff, AZ 86001, and WA7NXL via P.O. Box 201, Flagstaff, AZ 86002.

● **The following hamfests, etc., are slated for July:**

July 4, **Harrisburg Annual Hamfest,** Bressler, PA. Contact Dave, KC3MG, 131 Livingston St., Swatara, PA 17113, or call 1-717-039-4957.

July 7, **South Milwaukee ARC Swapfest,** Oak Creek, WI. Contact South Milwaukee ARC, P.O. Box 102, S. Milwaukee, WI 53172.

July 8, **Wood County Ham-A-Rama,** Bowling Green, OH. Contact Wood County ARC, c/o Craig Henderson, Box 366, Luckey, OH 43443.

July 14, **Ontario Hamfest,** Milton, Ontario, Canada. Contact BARC, P.O. Box 836, Burlington, Ontario, L7R 3Y7, Canada.

July 14, **SCARC '84,** Augusta, NJ. Contact Donald R. Stickle, K2OX, Weldon Rd., RD 4, Lake Hopatcong, NJ 07849, or call 201-663-0677.

July 14, **Eau Claire ARC Hamfest,** Eau Claire, WI. Contact Gene Lieberg, KA9DWH, 2840 Saturn Ave., Eau Claire, WI 54703 (s.a.s.e.).

July 14, **Sheboygan County ARC Lakeshore Swapfest and Brat Fry,** Wilson Town Hall, south of Sheboygan, WI. Contact KR9S, 6400 Hawthorn Road, Sheboygan, WI 53081, or call 414-457-3366 after 5 p.m. CDT.

July 14, **Mt. Beacon Hamfest,** Poughkeepsie/LaGrange, NY. Contact Art Holmes, WA2TIF, 2 Straub Dr., Pleasant Valley, NY 12569, or call 914-635-2614.

July 14–15, **Charleston ARS Hamfest,** Charleston, SC. Contact Charleston Hamfest Committee, P.O. Box 70341, Charleston Heights, SC 29405.

July 14–15, **John Ross ARC Hamfest,** Rossville, GA. Contact John Ross ARC, P.O. Box 853, Rossville, GA 30741.

July 14–15, **International Hamfest,** International Peace Gardens between Dunseith, ND, and Boissevain, Manitoba. Contact William W. Bosch, WD@EMY, International Hamfest, Box H, Dickinson, ND 58601.

July 15, **LaPorte/Michigan City ARC's Summer Hamfest,** LaPorte County Fairgrounds, west of LaPorte, IN. Contact LPARC, P.O. Box 30, LaPorte, IN 46350.

July 15, **Hall of Fame Hamfest,** Louisville, OH. Contact Butch Lebold, WA8SHP, 10877 Hazelview Ave., Alliance, OH 44601, or call 216-821-8794.

July 15, **West Jersey Radio Amateurs Hamfest,** Edgewater Park, NJ. Contact Mary Lou Shontz, N2CLX, 107 Spruce Lane, Route 16, Mount Holly, NJ 08060 (s.a.s.e.), or call 609-267-3063.

July 20–22, **Glacier-Waterton International Hamfest,** Three Forks Campground, southern end of Glacier National Park, MT. Contact Shirley Smith, KC7OA, 1822 14th Ave. South, Great Falls, MT 59405 (s.a.s.e.).

July 21, **Straits Area ARC Swap-Shop and Computer Demonstration,** Pellston, MI. Contact Irene Stein, KA8NKS, 4487 Robinson Rd., Pellston, MI 49769, or call 616-539-8986.

July 21, **NOARSFEST,** Wellington, OH. Contact NOARSFEST, P.O. Box 354, Lorain, OH 44052.

July 21–22, **Ham Holiday and State ARRL Convention,** Oklahoma City, OK. Contact CORA, P.O. Box 44091, Oklahoma City, OK 73144.

July 21–22, **"Breakfast Club" Hamfest,** Terry Park, east of Palmyra, IL. Contact Hamfest, c/o Quad Co. ARC, 602-D East Walnut, Chatham, IL 62629.

July 22, **Triple States RAC Wheeling, WV Hamfest,** Wheeling, WV. Contact TSRAC, Box 240, RD 1, Adena, OH 43901, or call 614-546-3930.

July 27–29, **1984 DX Convention,** Beaverton, OR. Contact Bob Herndon, W7XN, 607 Andover Place, Portland, OR 97202, or call 503-232-2740.

July 28, **Eyeball Bivouac/Luncheon,** Canandaigua, NY. Contact Harry B. Thomsen, W2PJH, 348 Jefferson Ave., Apt. 15, Canandaigua, NY 14424 (s.a.s.e.).

July 28, **Upper Peninsula Hamfest,** Houghton, MI. Contact Howard Junkin, N8FHF, 106 West South St., Houghton, MI 49931, or call 906-482-4630.

July 28–29, **WCARS Hamfest,** Asheville, NC. Contact Nelda Williams, KA4WPM, P.O. Box 1488, Asheville, NC 28802.

July 28–29, **Okanogan Valley International Hamfest,** Omak, WA. Contact KS7C or WA7ZEV.

July 29, **BRATS Maryland Hamfest and Computerfest,** West Friendship, MD. Contact BRATS, P.O. Box 5915, Baltimore, MD 21208, or call W3GXK at 301-655-7812.

July 29, **Nashville Ham and Computer Fest,** Nashville, TN. Contact Willie Porter, KB4BLL, 4907 Idaho Ave., Nashville, TN 37209 (s.a.s.e.), or call 1-615-269-9757.

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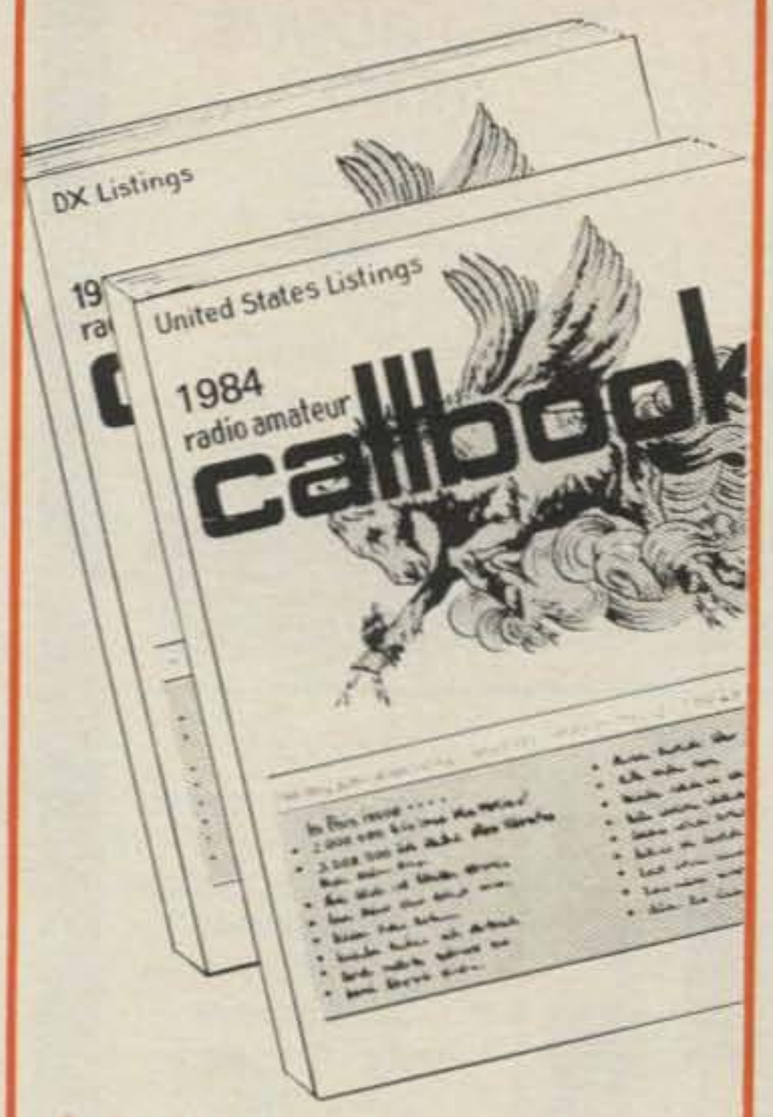

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CIRCLE 16 ON READER SERVICE CARD

Amateur Licensing

This column lists the current requirements for obtaining the various Federal Communications Commission (FCC) amateur radio operator licenses. For the absolute latest information, please contact the nearest FCC office or else telephone Dick Bash, KL7IHP at (415) 278-8275.

NOVICE CLASS This is the typical beginning license. The applicant must pass a 5 word per minute (w.p.m.) International Morse Code test and then pass a 20 question written test on basic theory and rules from a properly licensed examiner. The examiner must be an amateur radio operator who holds a General, Advanced, or Extra Class license and meets the requirements specified in 97.31 of the FCC Rules. The examiner will grade the exam on the spot and, if the applicant passes, will complete and forward the applicant's FCC Form 610 to the FCC in Gettysburg, PA. The FCC will then mail the applicant his/her Novice license in about a month. The Novice licensee can only transmit in Morse code on the designated HF Novice Class bands. Legal details are in 97.27 through 97.33 of the FCC's Rules & Regulations. Anyone interested in the Novice Class or in examining a Novice applicant should read these rules.

TECHNICIAN CLASS This license gives the holder Novice Class privileges on the HF bands and full amateur privileges above 30 megahertz (MHz). The exam for the Technician consists of a 70 question written test and a 5 w.p.m. code test unless the applicant has already passed a Novice exam, in which case he/she doesn't have to retake the code test or the 20 Novice Class written questions. The "Tech" license gives you voice, television (fast- or slow-scan), radioteletype (RTTY), and facsimile privileges. It even lets you communicate via the amateur satellites that orbit the Earth!

GENERAL CLASS The General ticket gives you full amateur privileges above 30 MHz (just like the Tech ticket) but also gives you voice, RTTY, slow-scan television (SSTV), and facsimile privileges on the HF bands. You are also given additional frequencies for code. To get a General Class ticket, you must pass a 13 w.p.m. code test and the 70 question written exam mentioned in the previous discussion about the Tech license.

ADVANCED CLASS This license gives you additional HF privileges for voice, etc. If you presently hold a General Class license, you need only to take and pass an additional 50 question written exam.

EXTRA CLASS This is the highest level of license that the FCC currently has for amateur radio operators. This gives you all possible privileges and (if you presently hold an Advanced Class license) requires that you first pass a 20 w.p.m. code test and then pass a 40 question written test. All of the above licenses are valid for 10 years and are renewable.

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The pre-programmed BT-1 computerized trainer will allow you to achieve proficiency in Morse code faster than any other known method.

No prior knowledge of Morse code is required to use the BT-1. There are no tapes to purchase or wear out. The BT-1 operates from a 12 VDC source or from the AEA 117 Vac wall adapter unit, AC-2. For portable use the BT-1P is available with Nicad batteries and comes with a charger that operates from 117 Vac. The unit can also be used in mobile settings via the 12 VDC system.

*Education Technology & Services, see page 81, October 1981 issue of Ham Radio Magazine.

Price and Specifications Subject To Change Without Notice or Obligation.

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A CQ Exclusive Interview With:

Dr. Robert S. Powers, Jr. Chief Scientist, FCC

BY DR. THEODORE J. COHEN*, N4XX

Dr. Robert S. Powers, Jr., Chief Scientist, Office of Science and Technology, FCC.

Dr. Robert S. Powers, Jr., received his BS degree in chemistry and mathematics from Southern Methodist University in 1955, and his PhD in physical chemistry from the University of Wisconsin in 1960. In the years following his graduate training Dr. Powers held various positions with the National Bureau of Standards, where, among other activities, he authored a technological forecast on "the wired city" for the President's Task Force on Communications Policy. Following five years of work with the U.S. Department of Commerce, Office of Telecommunications—during which time he authored a number of papers on cable television and broadband communications systems—Dr. Powers joined the Federal Communications Commission in 1975 as a general physical scientist. Here he rapidly moved up the technical and management ladders, achieving his present position, that of Chief Scientist, in June 1983. Among his many honors were his participation in the 1979 IEEE delegation to the annual meeting of the Popov Society, in Moscow, USSR, as part of the US/USSR Cultural and Technical Exchange Program, and his receiving the Group Special Achievement Award from the FCC in 1980. Dr. Powers lives with his wife, Virginia, and one of their two college-age children in Gaithersburg, MD, and in his spare time he enjoys photography, white-water canoeing, and the bassoon.

It is with great pleasure, then, that we present this exclusive CQ interview with Dr. Robert S. Powers, Jr., Chief Scientist, FCC.

CQ: Dr. Powers, could you give us a brief overview of OST . . . its purpose, organizational structure, and people?

Powers: I think OST's purpose can be summed up rather succinctly by saying that we are responsible for the care and feeding of the radio spectrum. The task involves planning for spectrum use, first at the international level and then domestically; keeping the spectrum "clean" so that use is possible; and making more efficeint use of spectrum already allocated. Functionally, OST is divided accordingly. Our International Staff, headed by Ed Jacobs, coordinates much of the Commission's participation in international radio conferences. The Spectrum Management Division, under Will McGibbon, plans for domestic spectrum use and is responsible for proposing to the Commission spectrum allocation and reallocation matters. Additionally, this division maintains constant liaison with U.S. Government spectrum managers and attempts to coordinate occasionally conflicting demands for spectrum between civil and government users. The Authorization and Standards Division is run by Bob Cutts. Here we atttempt to regulate the r.f. energy emitted from equipment used to transmit or receive in the various licensed and unlicensed communications services. The Technical Analysis Division, headed by Mike Marcus, is responsible for studying more intensive spectrum uses and factoring new technological developments into questions of spectrum availability. This division also is at present directing the course of Docket 83-114, a sweeping inquiry into the continued necessity for many of the Commission's technical standards.

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```
                                    hh:mm:ss

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OPTIONS MENU SCREEN

```
                                    hh:mm:ss
 I. CALLSIGN                      ??????
 S. SELCALL                         ????
 T. ARQ TIMEOUT                       30
 U. USOS                              ON
 M. MORSE FILL (BT)                  OFF
 R. RTTY SYNC (NUL)                  OFF
 A. AUDIO FEEDBACK                   OFF
 C. AUTO CR                           ON
 L. AUTO LF                           ON
 B. BEACON RECORD                    OFF
 W. WRAP-AROUND                       ON
 K. CW BREAK-IN                      OFF
 O. OUTPUT MODE                     WORD
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- Transmits RTTY idle character during breaks in KB activity.
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- Sends a line feed after each carriage return.
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COMMAND MENU SCREEN

```
                                    hh:mm:ss

 L. LOAD
 E. EDIT
 M. MOVE
 S. SAVE
 X. SET XMT BUFFER SIZE
 C. SET COLOR
 T. SET TIME
```

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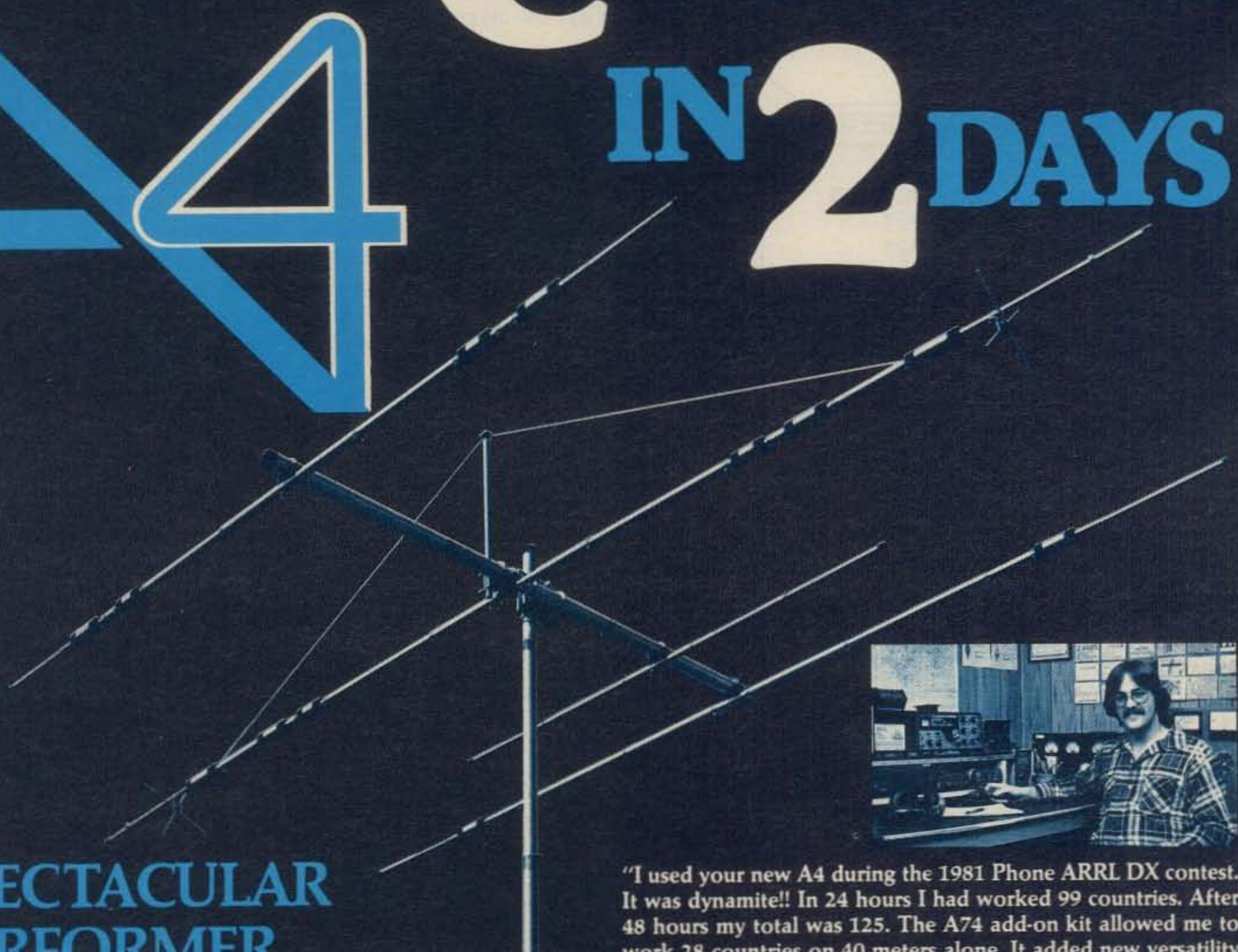

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Dr. Powers and his staff share a lighter moment in an otherwise busy day (left to right are Frank Williams, Robert Powers, Frank Wright, and Hank Schuett).

"We are responsible for the care and feeding of the radio spectrum."

CQ: In what ways does OST provide the scientific and technical support required by the Commissioners and the Chairman?

Powers: Ted, we are often called upon for technical advice both by the Commissioners and the operating Bureaus. "Advice," of course, is a term that can encompass a brief telephone conversation or involve lengthy participation in the preparation of agenda items. We do both. We also routinely review the Commission's agenda items for their technical content.

CQ: With respect to the Authorization and Standards Division, what are its areas of responsibility?

Powers: ASD is responsible for administration of the equipment authorization program and for the development of technical standards upon which most of our service rules are based. Additionally, the Division oversees Parts 15 and 18 of the Commission's Rules relative to the use of low-power radio-frequency devices and industrial, scientific, and medical equipment, respectively. An ancillary, but nevertheless important, responsibility is the calibration of equipment used by the Field Operations Bureau and the Commission's Laboratory.

Specifically, ASD's functions relate to working at both the national and international levels in standards development activities, and ensuring that telecommunications equipment either meets, or is capable of meeting, prescribed standards to protect communication systems against harmful radio frequency interference. To do this, representative equipment is tested, either by the Laboratory or by the manufacturer, to verify that capability prior to allowing the equipment to be marketed or operated. Depending on the type of equipment, there are several variations of test procedures involved. These include type approval, type acceptance, certification, verification, and notification.

In addition, the Division personnel represent the Commission on national standards bodies, such as the IEEE and ANSI, and at international conferences, such as CCIR and CISPR.*

CQ: In 1983, Congress passed Public Law 97-259, which gave the Commission the authorization to develop and promulgate radio-frequency interference (r.f.i.) standards for electronic home-entertainment equipment, in general, and television receivers, in particular. The problem of r.f.i., of course, is of utmost concern to amateur operators, and so we would be interested in knowing what progress, if any, OST has made in carrying out the will of the Congress.

Powers: As you are aware, Public Law 97-259 gave the Commission the authority to develop and promulgate standards for the susceptibility of home electronic devices; it did not require the Commission to adopt regulatory standards for such devices. This allows the Commission to apply the degree of regulatory control needed to address the problem while presenting a minimal burden upon the public. If the Commission were to adopt a susceptibility standard at the present time, it is very unlikely that it would be the correct one to adequately address the problem. If we were to adopt a standard that was too lenient, the problem would not be alleviated. On the other hand, if the standard were so restrictive that it placed an unwarranted burden upon the home-entertainment market, it could adversely affect the price the public would have to pay for such devices. This could spark a public reaction which might result in reducing the immunity requirement for home-entertainment equipment to a point that could place severe restrictions on the operation of other devices and services.

"Public Law 97-259 gave the Commission the authority to develop and promulgate standards for the susceptibility of home electronic devices; it did not require the Commission to adopt regulatory standards for such devices."

In order to address this matter in a balanced manner, OST is working with the voluntary standards organizations in an effort to develop standards and measurement procedures that will reduce susceptibility problems. The American National Standards Institute (ANSI) has set up a susceptibility subcommittee which has members from AT&T Information Systems Laboratories (formerly Bell Labs), IEEE, FCC, University of Pennsylvania, GE, EIA, and ARRL. At the request of OST, the Committee is investigating the problem of r.f.i. to TV receivers as its primary objective. Other devices will be considered in the future. The Committee is progressing satisfactorily in their work, and I believe their efforts and ours will be effective in carrying out the Congressional intent.

CQ: Do you believe that the progress to date, if any, is adequate in light of the fact that r.f.i.

**IEEE, Institute of Electrical and Electronics Engineers; ANSI, American National Standards Institute; CCIR, International Radio Consultative Committee (English translation from the French); CISPR, International Special Committee on Radio Interference (English translation from the French).*

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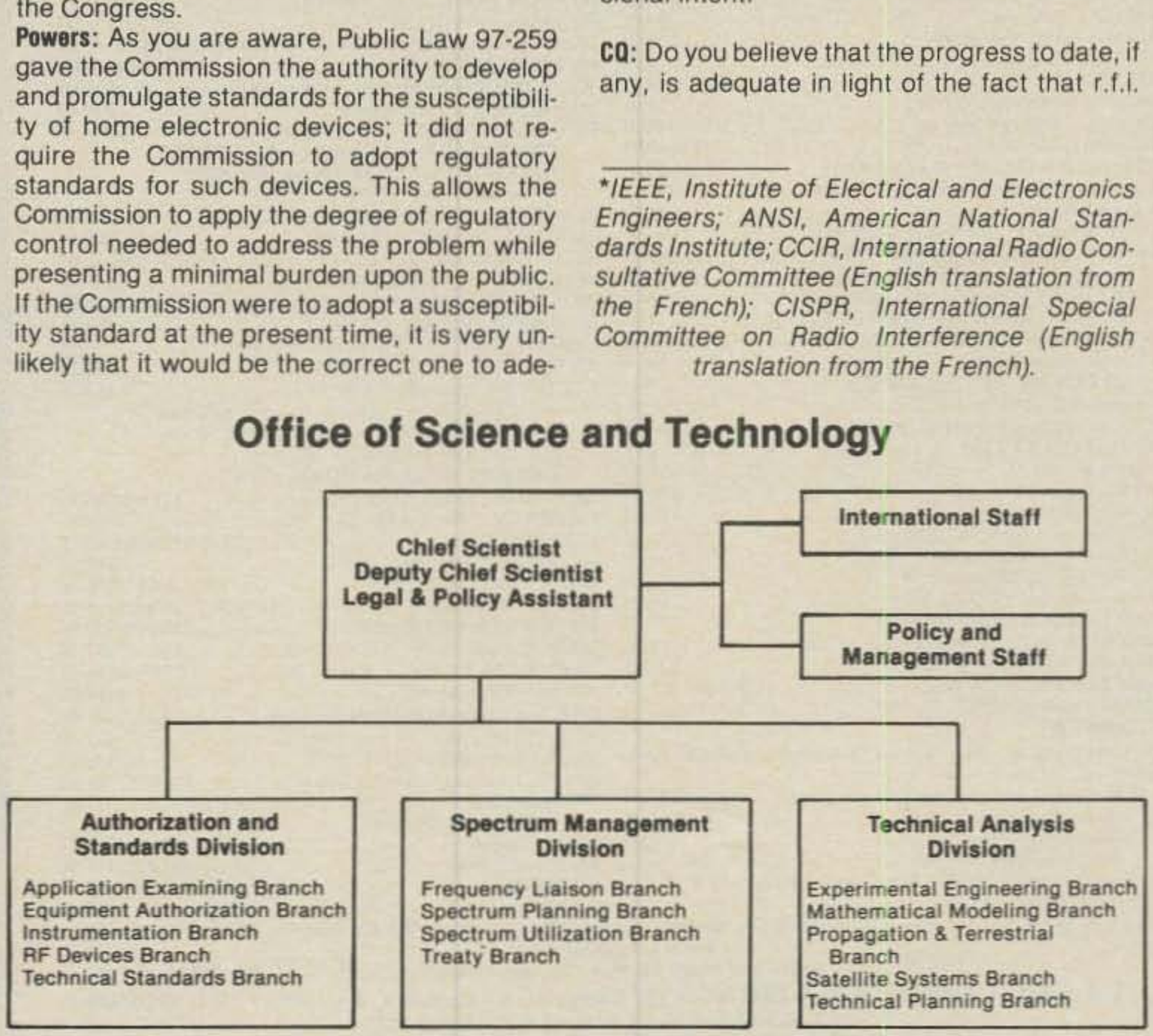

complaints to the Commission again appear to be on the increase?

Powers: I believe that the progress to date is significant and that the approach being taken is the most reasonable. The private sector is very cooperative in addressing this matter. All sides are talking. By developing voluntary standards and measurement procedures, we provide the greatest flexibility to be able to respond to need. In the event we find the voluntary approach is not working, we have the authority to regulate. However, we only wish to do that as a last resort and have no plans to do so as long as the voluntary efforts proceed to satisfactorily address the problem. Our primary concern at this time is the development of standards. The matter of enforcement will be addressed as needed.

CQ: Are you "working" the r.f.i. problem in concert with the Field Operations Bureau?

Powers: OST has discussed the problem of interference complaints with FOB, and we are told that interference complaints are increasing because of the increasing number of devices that produce and receive electrical signals. FOB pointed out that it is often difficult to identify the interference source; however, some interference problems can be solved by changing the installation of equipment; that is, by grounding or changing physical location. The physical installation of the equipment is a major factor in interference cases.

CQ: Who within OST is responsible for monitoring the r.f.i. problem and for pursuing solutions through the imposition of r.f.i. susceptibility standards?

Powers: The Technical Standards Branch has the primary responsibility for the Commission's responses to the matter of the susceptibility of home electronic devices and systems to electromagnetic radiation. Others involved include the RF Devices Branch, and the Experimental Engineering Branch at the Laboratory location.

CQ: Given that television receivers historically have been the "victim device" in more than 75% of all alleged r.f.i. complaints, what plans does the Technical Standards Branch have for addressing this particular problem?

Powers: Ted, the Technical Standards Branch is working with the ANSI susceptibility Ad Hoc Committee on this issue. The susceptibility of the TV receiver has been identified as the number one priority of the Ad Hoc Committee. In response to this, the Electronic Industries Association (EIA) has been working on a proposed EIA interim standard No. 10, "Immunity of TV Tuners to Internally Generated Harmonics Interference from Signals in the Band, 535 kHz to 30 MHz." The proposed standard is a revision of EIA Bulletin 8A, extending the present CB performance guideline to cover the AM broadcast band and amateur radio frequencies below 30 MHz. In addition, the ARRL has developed a questionnaire with the assistance of the ANSI subcommittee to collect data on interference cases. The Technical Standards Branch will also be reviewing information from interference cases reported to FOB. I believe that this information will give us a better understanding of the problem and will result in the development of standards that will reduce the number of interference complaints.

CQ: What technical aspects of the Amateur Rules, if any, are being considered by your staff for deregulation?

"The 18.068–18.168 MHz and 24.890–24.990 MHz bands will be allocated to the Amateur service on a Primary basis after all Fixed service operations have been reaccommodated."

Powers: At this time there are no specific Amateur service regulations being considered for elimination. We work closely with the Private Radio Bureau in studying the rules for possible over-regulation, and try our best to be responsive to the needs of the amateur community.

CQ: The Commission has recently taken steps to implement the Decisions of the 1979 World Administrative Radio Conference (WARC). Could you comment on when amateurs will obtain a permanent Secondary allocation in the 10.1–10.15 MHz band?

Powers: The band 10.1–10.15 MHz is now available for amateur use. The Second Report and Order in General Docket 80-739, Implementation of the Final Acts of the 1979 World Administrative Radio Conference, which was adopted on November 8, 1983, allocated the 10.1–10.15 MHz band to the Amateur service on a Primary basis in the United States. However, on an international basis, amateur use of this band is Secondary to the Fixed service.

CQ: What about the new 18 and 24 MHz bands? How soon do you think we'll gain entry here?

Powers: The 18.068–18.168 MHz and 24.890–24.990 MHz bands will be allocated to the Amateur service on a Primary basis after all Fixed service operations, which are recorded in the Master Register (the official ITU register) have been reaccommodated. This reaccommodation process must take place no later than July 1, 1989. We will monitor the reaccommodation process of the Fixed service and make these bands available for amateur use as soon as possible by removing the restriction on the Amateur service, footnote US248 to the Table of Frequency Allocations (§2.106), once the reaccommodation process has been completed.

CQ: Dr. Powers, amateurs are looking forward to using the new band at 902–928 MHz. When do you think the Commission will implement the amateur assignment here, and what special responsibilities will we incur once operations begin?

Powers: Footnote US275, which was adopted in the Second Report and Order in General Docket 80-739, allocated the band 902–928 MHz for amateur use on a Secondary basis. US275 reads as follows:

> "US275: The band 902–928 MHz is allocated on a secondary basis to the amateur service subject to not causing harmful interference to the operations of Government stations authorized in this band or to Automatic Vehicle Monitoring (AVM) systems. Stations in the amateur service must tolerate any interference from the operations of industrial, scientific and medical (ISM) devices, AVM systems and the operations of Government stations authorized in this band."

Therefore, amateur operations in this band will have to protect government stations and automatic vehicle monitoring systems. How-

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ever, before this band will be available for amateur use, it is necessary that Part 97 of the Rules, Amateur Radio Service, be modified to provide service rules for this band. The Commission is currently waiting for proposals from the public on how best to implement this band to the Amateur service.

CQ: Changing the subject, the Soviet Union for many years has operated several over-the-horizion (OTH) radar systems in the high-frequency bands. Much of their activity took place on frequencies allocated to the Amateur service. What efforts did OST make, either directly or through the Department of State, to move these systems—also known as "woodpeckers"—out of our bands?

Powers: After interference from the Soviet "woodpecker" system was reported during the summer of 1976, OST sent a telegraphic message to the USSR Administration requesting assistance in the elimination of the harmful interference. In the absence of any response from the USSR to four such telegrams from OST, the assistance of the IFRB* was requested on Oct. 6, 1976. The IFRB shortly advised us that they had sent a telegram to the USSR seeking resolution of the matter. By November 1976 OST began providing the State Department with summaries of complaints and observaticns on the interfering emissions. On Dec. 3, 1976 OST received a response from the USSR stating that the operations involved were experimental, that they would cause interference of short duration, and that action was being taken to decrease the interference. The IFRB reported a similar response from the USSR by telegram to OST on December 22, 1983. The interference continued, however, and the US State Department decided to take up the matter through diplomatic channels. The US embassy in Moscow made strong pleas with the USSR to eliminate the interference on a number of occasions. The only promise made by USSR officials was that they were aware of the problem and that they would look into it with a view toward reducing the interference. Since other countries were also receiving the same interference and complaining to the USSR to no apparent avail, the US Department of State consulted with these countries to find a suitable, unified approach which might induce the USSR to finally take some action. As a result of this, the issue was raised at the 1978 Aeronautical Mobile WARC. Some of the affected countries entered a protocol statement (No. 45) to the Final Acts produced by that WARC, which was a public statement of their concern over the situation. The US Administration did not associate itself with the statement. The issue was expected to come up again at the 1979 WARC, but it did not. The US took the matter as far as deemed appropriate and did not pursue it further. While the USSR claims to have made adjustments to avoid interference to safety-of-life services, it is clear that they do not intend to turn off the system.

CQ: Is the US continuing to press the Soviet Union in this matter? If so, what is being done?
Powers: The US would, of course, use any appropriate negotiating leverage it can muster to get the USSR Administration to eliminate the interference; however, one must remember

**IFRB, International Frequency Registration Board, a part of the ITU.*

Frank Rose (left) and Frank Williams review recent submissions to CCIR Study Group 8 regarding technical standards for the Amateur service.

"It is clear that the USSR does not intend to turn the 'woodpecker' off."

that there is little incentive for the USSR to do so in the near term. Any further action by our Government would have to be balanced against other long-term foreign policy objectives, which are matters for the Department of State. OST is maintaining a file of complaints which can be drawn upon for negotiating purposes when the appropriate occasion arises.

"OST's policy on band sharing is that more intensive use of available bands must be made . . . this implies more band sharing."

CQ: What is OST's current policy *vis-a-vis* "band sharing?"
Powers: OST's policy on band sharing is that more intensive use of available bands must be made, since the currently undeveloped spectrum exists mainly in a higher region of the spectrum where the propagation characteristics do not support many of the desirable communication traits. This implies more band sharing, which we believe can be achieved through applications of comprehensive assignment data and sophisticated engineering models containing well-developed propagation and interference algorithms. The advances in computer technologies will make these applications more and more practical and accurate. This increased sharing will, of course, require greater coordination and cooperation among users of the bands. This must be accomplished at the local level, and the Commission will increasingly remove itself from the detailed decision-making which the private sector will be in a better position to perform.

CQ: How could this policy affect the Amateur and Amateur-Satellite services?
Powers: We expect the Amateur and Amateur-Satellite services will be able to take advantage of this policy in the future by implementing their services where they are allocated on a shared basis with other services. We hope that the amateur community will be able to aid the Commission in developing advanced coordination techniques for greater band sharing among the services by proposing and developing new and innovative ideas.

CQ: With what services would the Amateur and Amateur-Satellite services have the most difficulty in sharing frequencies?
Powers: The services that will probably be the hardest for amateurs to share with are the services which involve the safety of property and life, such as the Public Safety service. These services require reliable communications systems all the time, and it will be hard for them to share with any other service. Aeronautical telemetering and telecommand operations, within the Mobile service, is another service that requires reliable communication systems completely free of all possible interference, as often the pilot and aircraft are completely dependent on the communication system.

"We hope that the amateur community will be able to aid the Commission in developing advanced coordination techniques for greater band sharing among the services by proposing and developing new and innovative ideas."

CQ: Dr. Powers, when will we next be called upon to defend our allocations? That is, what are the dates of the major ITU conferences during the 1980s and early 1990s at which the ITU will deliberate allocations involving the amateur bands?
Powers: At present there are no ITU conferences scheduled that are competent in making changes to the Table of Frequency Alloca-

Say You Saw It In CQ

tions. The only currently scheduled ITU conference that might have an impact on the Amateur service is the two-session Space WARC, which is scheduled to convene in 1985 and 1988. As the Amateur service is authorized to operate via satellites in the Amateur-Satellite service, operations of this service could be affected by the decisions of the Space WARC.

CQ: What should we be doing now to prepare for the Space WARC?
Powers: As part of the Commission's preparations for the Space WARC, we are examining ways in which guaranteed equitable access to the geostationary-satellite orbit can be assured without the need for rigid, detailed *a priori* planning of the various space services. Rigid, detailed planning would be particularly cumbersome and threatening to the Amateur service. Amateurs, through their national and international organizations, should stress the need for identifying flexible methods for gaining access to the geostationary orbit for all services, in general, and for the Amateur service, in particular.

"The amateur community's work in designing and developing packet radio has been exceptional."

CQ: With respect to spread-spectrum modulation, packet radio, and other advanced communication techniques, do you think that US amateurs are adequately pursuing the experimental aspects of our service?
Powers: While the amateur community has not devoted a lot of time to developing spread-spectrum systems, their work in designing and developing packet radio has been exceptional. The amateur community is on the forefront of this "high tech" industry, and it is to be commended on its dedication and willingness to design and develop new and innovative radio communications technology.

CQ: During the deliberations on a "no-code" license, OST put forth a proposal to create a class of license similar to the Digital Radio Operator's Certificate issued by the Canadian Department of Communications. While creation of a no-code license has been rejected by the Commission, word has it that the Commission is considering the creation of a new radio service that would meet the needs of computer enthusiasts. Wouldn't it strengthen the Amateur service if computer applications were addressed within the framework of our service rather than within a new service?
Powers: When the Commission recently rejected the "no-code" proposal, it left the door open for a possible computer-oriented class of license—not necessarily a new radio service. However, it was decided to take no further action unless a specific petition is received. In a sense, then, this matter is in the hands of the amateur community or others who wish to pursue this activity.

CQ: What is OST doing to encourage experimentation within the Amateur and Amateur-Satellite services?
Powers: OST is supporting experimentation in the Amateur and Amateur-Satellite services by authorizing operation of these services under Part 5 of the Commission Rules, Experimental Radio Services (other than Broadcast), in bands that are not allocated to the Amateur or Amateur-Satellite services. Ted, we believe that these authorizations will help foster the necessary environment for amateurs to stay at the forefront of designing and developing new radio communications technologies.

"When the Commission recently rejected the 'no-code' proposal, it left the door open for a possible computer-oriented class of license—not necessarily a new radio service."

CQ: How important is it for the Amateur and Amateur-Satellite services to participate in the proceedings of the CCIR?
Powers: I believe that such participation is extremely important. As you may know, the Amateur service first became involved with the CCIR during preparatory efforts for the 1979 World Administrative Radio Conference. The service was accepted into Study Group 8, and several documents were accepted at the Special Preparatory Meeting for use during the WARC. This visibility aided the Amateur service in obtaining additional frequency allocations by showing the very valuable services being performed. Later, the Amateur-Satellite service was included in the work of Study Group 8, and the status of the Amateur/Amateur-Satellite service was elevated to one of the three categories of Service comprising the Study Group. So you see, by such participation, the Amateur/Amateur-Satellite service has achieved international prominence and recognition for the valuable contributions being made to the communications community.

CQ: What areas of concern to amateurs are now being addressed by the CCIR in the US and on the international level?
Powers: There are a considerable number of areas in which the amateurs are either directly or indirectly concerned. For example, AMTOR (Amateur Teleprinting Over Radio) is based on CCIR Recommendation 476-2, and the revision 476-3, which addresses direct-printing telegraphy equipment in the Maritime Mobile service. In addition, there are two Questions which apply directly to the Amateur/Amateur-Satellite service. Question 48-1/8 concerns Techniques and Frequency Usage in the Amateur Service, which is addressed by Report 905, Technical Investigations in the Amateur Service, and Report 906, Frequency Usage in the Amateur Service. Question 50/8 concerns Technical Feasibility of Frequency Sharing by the Amateur-Satellite service, which is addressed by Report 542-1, with the same title. At the present time, Ad Hoc E of the United States Study Group 8 is reviewing Report 542-1 in order to eliminate out-dated information, provide current information, and make it of greater use to the international community. So you see, there are many facets of CCIR efforts which are of concern to amateurs.

CQ: Isn't there a danger that amateur participation in the CCIR could cause the body to impose certain "guidelines" that could put our service in a technical straight jacket?
Powers: Like anything else, we have to weigh the risks involved against the benefits obtained. As I said earlier, it was through the am-

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ateur participation in the CCIR work leading up to the 1979 WARC that major gains were made in worldwide recognition of the Amateur service and the subsequent increase in the frequency allocations. Through responsible participation at this time, the Amateur service is able to be of service to the international communications community and also to benefit from work being done in Study Group 8 and the other study groups of the CCIR. Therefore, I believe these benefits outweigh the risks involved in participation. You are correct in your concern that the Amateur service could be "tasked" in an undesirable manner. However, a large number of the participants in the work of Study Group 8 are "hams" themselves. They understand the unique character of the service, and the fact that the maximum benefits have accrued and will continue to accrue to the communications community only if the Amateur service is allowed to grow in its present form.

CQ: If amateurs want to participate in the deliberations of the CCIR, whom should they contact?

Powers: In the United States, Ad Hoc E of Study Group 8 is the forum for deliberations of Amateur/Amateur-Satellite matters. The Convenor of Ad Hoc 8E is Frank Rose, who is Chief of the Technical Standards Branch here in OST. Participants in the activities include people from the ARRL, who provide input to the US effort. Individuals desiring to participate in meetings of Ad Hoc 8E may do so, up to the number limitations imposed by limited space for meetings; there is usually room for about 20 attendees. However, anyone is welcome to participate through correspondence and may do so by addressing their views or comments to Frank Rose, here at the Commission. All comments will be considered, but since CCIR actions are by consensus, all comments will not necessarily be adopted. If there are any questions, Frank can be reached at (202) 653-6288. Any mail may be sent to Frank L. Rose, Chief, Technical Standards Branch, Federal Communications Commission, Washington, DC 20554.

CQ: Dr. Powers, what is OST's position on the development of standards for human exposure to non-ionizing r.f. radiation?

Powers: Ted, this is an area that is receiving increasing attention. We fully support the development of reasonable and scientifically sound standards. However, the FCC is not a health and safety agency, and we must rely on other federal agencies for guidance in this area. For example, the Environmental Protection Agency (EPA) is currently developing guidelines for exposure of the public to r.f. radiation, and in a 1983 letter from our Chairman to the EPA Administrator, the Commission went on record as encouraging EPA in its effort. We are also cooperating with EPA through our membership in the Interagency Working Group set up to assist EPA in the development of the proposed guidelines. We also maintain contact with other agencies and organizations involved in this area, such as the National Center for Devices and Radiological Health of the Food and Drug Administration, the Occupational Safety and Health Administration, and the National Council on Radiation Protection and Measurements.

In 1982, the Commission issued a Notice of Proposed Rule Making in response to our earlier Notice of Inquiry on the topic of FCC responsibility with regard to potential biological effects and hazards of r.f. radiation. Our NPRM proposed to rely on federal guidelines for exposure to r.f. radiation for determining compliance with our rules implementing the National Environmental Policy Act. We have received comments in this docket from a number of organizations and individuals, including the ARRL, and we still are considering how best to proceed with this proposal. A further item in this proceeding may be brought before the Commission later this year.

CQ: If the Commission adopts human exposure standards, will they supercede standards now in force or under development by municipal and state governments?

Powers: First of all, the Commission has not proposed to "adopt" exposure standards. Our NPRM would have us use certain standards as processing guidelines to determine potential effects on the human environment, but we have not proposed to establish any sort of official FCC standard. There has been concern over the potential proliferation of local and state standards in this area, and we agree that a patchwork of potentially conflicting standards could create serious problems in the telecommunications community. Our Office of General Counsel is looking into the broad question of federal preemption of local and state standards, and further guidance should be forthcoming as to what actions, if any, the Commission might consider taking in this regard.

By the way, Ted, it should be noted that many, if not most, of these local and state ordinances include language to the effect that if federal guidelines are issued, they will automatically supercede the local ones. Therefore, once the EPA guidelines are officially promulgated, we may see this problem largely disappear.

"What I sense is missing (from the Amateur service today) is the original sense of excitement—the innovation."

CQ: What is your personal opinion of the Amateur service in this country?

Powers: Traditionally, the Amateur service in this country has been a seed bed for new radio technology development, has performed significant service in times of emergencies, and has fostered a spirit among its members resulting in a great awareness of issues facing the amateur community. Clearly, the spirit, at least, is intact. What I sense is missing is the original sense of excitement—the innovation. This is not totally surprising. The technology has gotten away from all of us. We cannot expect the kind of new developments that characterized the amateur community in years past. Still, I wonder if we (yes, I was once an amateur myself) haven't all become a bit too much of the establishment. I look for amateurs to continue to support innovation but without being wedded to the past. I look for many more requests for experimental licenses or STA's for the amateur bands. We will be receptive.

CQ: Thank you, Dr. Powers, for a most enlightening view of OST!

Powers: Ted, it was my pleasure to meet with you today. CQ

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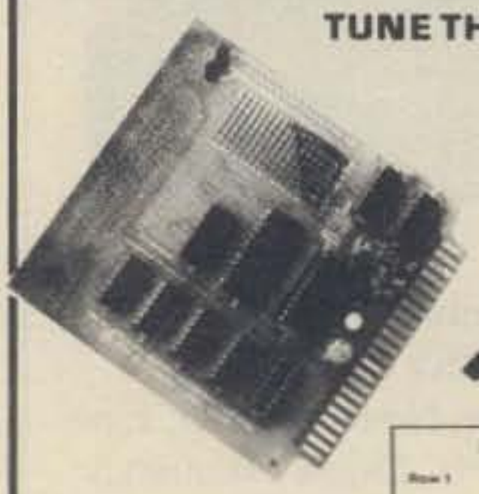

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- Anything you can do manually with your 16 digit keypad, the RAP-1 will do remotely using audio touch tones from any source.
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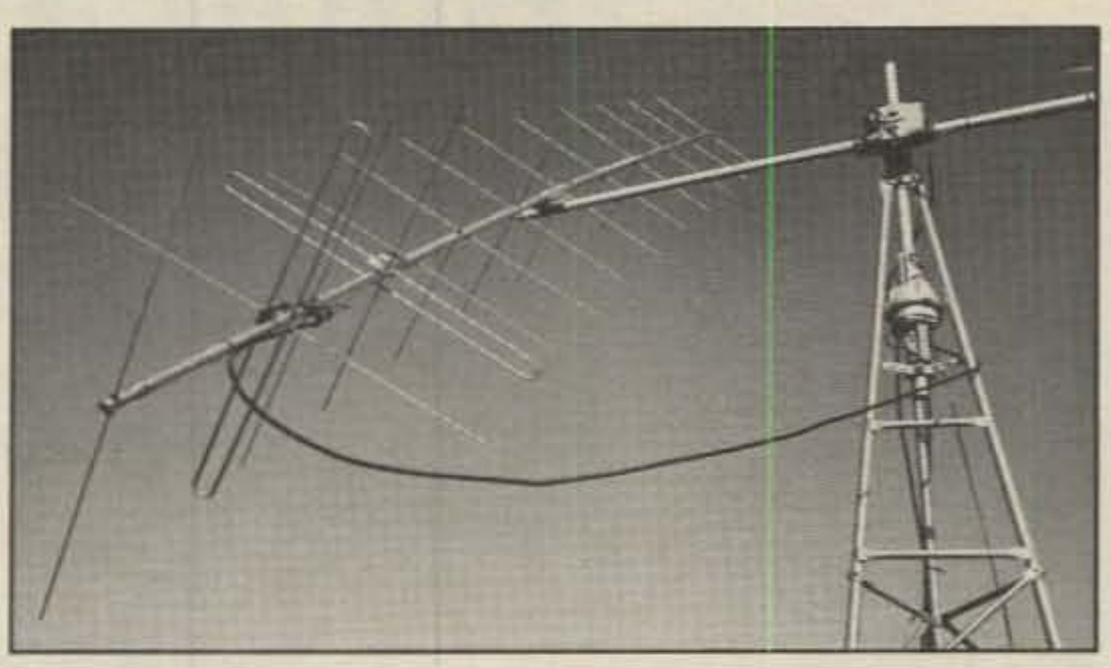
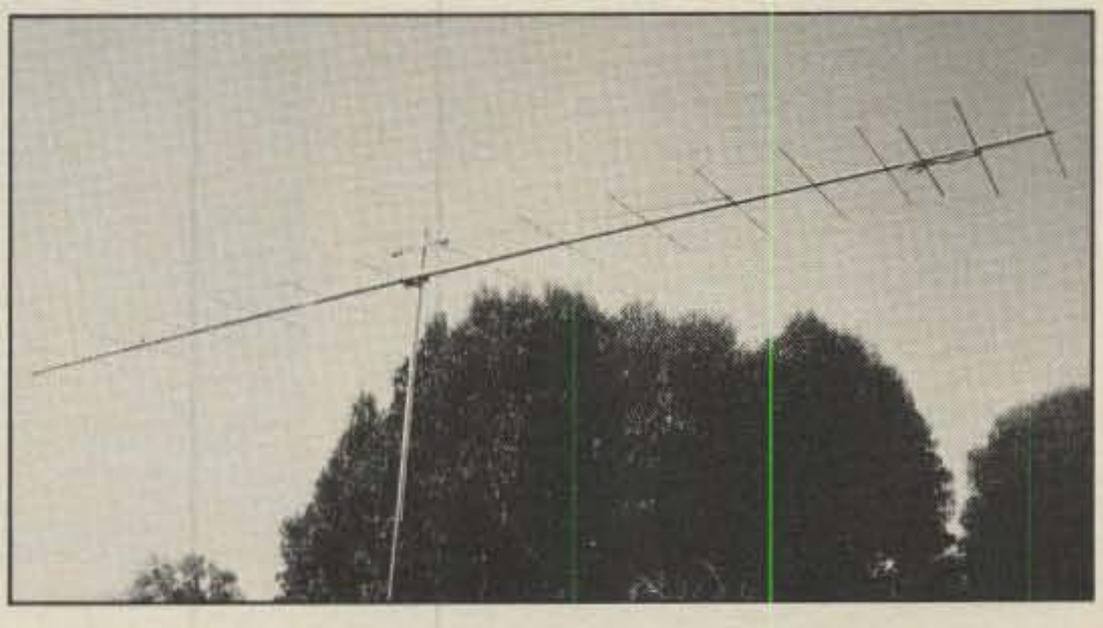


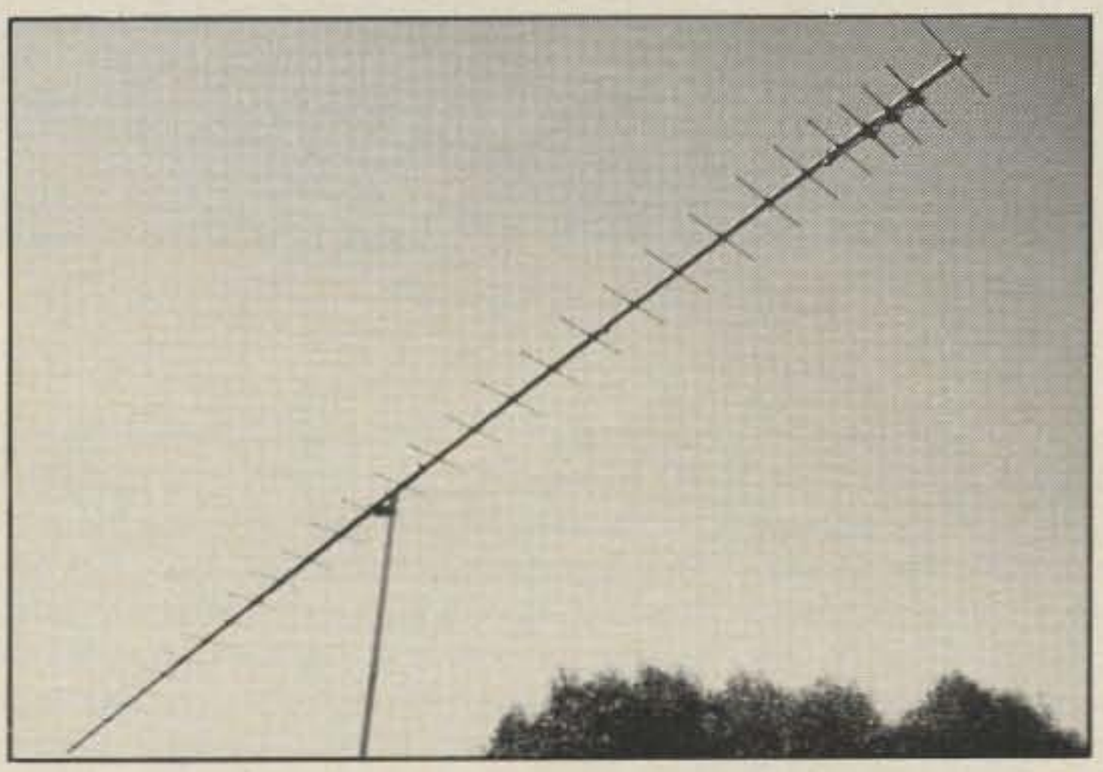
2M-22C

BANDWIDTH	144–148 MHz
*GAIN	13 dBdc
BEAMWIDTH	(E) 32°, (H) 32°
FEED IMP	50 ohms unbal.
BALUN	(2) 4:1 coaxial
BOOM LENGTH	19 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	1.85 sq. ft. max.
ELLIPTICITY	± 1.5 dB max.
CIRCULARITY SWITCHER	CS-3 included
WT. (lbs.)	11 lbs.



2M-16LBX

BANDWIDTH	144–146 MHz
*GAIN	(144 MHz) 14.5 dBd
BEAMWIDTH	(E) 26°, (H) 29°
FEED IMP	50 ohms unbal.
BALUN	4:1 coaxial, 2 KWPEP
BOOM LENGTH	28 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	(H) 1.75 sq. ft. (V) 2.44 sq. ft. max.
WT. (lbs.)	10 lbs.
TURNING RADIUS	15 ft. 5 in.



432-30LBX

BANDWIDTH	430–440 MHz
*GAIN	17.3 dBd
BEAMWIDTH	(E) 19°, (H) 20°
FEED IMP	50 ohms unbal.
BALUN	included
BOOM LENGTH	21 ft. 11 in.
F/B	20 dB F/S 30 dB
VSWR	1.5:1
WINDLOAD	1.71 sq. ft. (max.)
TURNING RADIUS	12 ft. 4 in.
WT. (lbs.)	9 lbs.

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Build Your Own Microphone Equalizer

BY CORNELIO NOUEL*, KG5B

It is a proven fact that speech frequencies between about 200 Hz and 4000 Hz contribute the most to intelligibility. Frequencies above and below these limits serve mainly to give identity or personality to the individual's voice.

In order to save frequency spectrum, present-day communication equipment restricts the bandwidth of the audio channel to those essential frequencies, both on transmit and receive. Under ideal conditions an overall flat frequency response will provide the best results; however, there are times when some intervening factor, such as the operator's voice or the microphone response or room acoustics, may affect the clarity required, especially under noisy conditions.

The unit described here, although not a cure-all, will help to modify the response of the audio to be transmitted within the passband of the equipment.

Front view of the microphone equalizer.

Description

The equalizer is a very simple and inexpensive unit. It can be built in a couple of evenings by practically anyone with a little experience. The circuit consists of a preamplifier, a low-frequency network, and a high-frequency network. These are also call **bass** and **treble** networks.

The amplifier provides about 30 dB gain, while the network losses add up to about 10 dB. Therefore, 20 dB of extra gain is available to compensate for variations in microphone levels.

In the schematic diagram (fig. 1) R5 controls the low frequencies, while R9 controls the high frequencies. The action of each control is quite independent of the other controls. The amount of **boost** or **cut** can be appreciated from the frequency response chart (fig. 4), which is an actual plot of the unit shown in the photograph and the schematic. A 20 dB spread is possible within the normal communications passband. R10 is a 10K ohm audio taper potentiometer which adjusts the output level of the equalizer so that it will not exceed the required amount.

The input signal goes through selector switch S1, a three-pole two-position rotary switch which selects the **In** or **Out** operation. This switch also turns the battery on or off. Battery current drain is only about a half ma at 9 volts. The equalizer will work with microphones with impedances from a few hundred to several thousand ohms.

When the **bass** and **treble** controls are set at their mid-position, the overall response of the unit is virtually flat from 20 Hz to over 20,000 Hz with little distortion.

To prevent r.f. feedback, the input circuit is provided with an LC low-pass filter consisting of a 330 μHy miniature ferrite-core choke and a 270 pF capacitor. No r.f. feedback has been observed while operating on the h.f. bands using a tuned antenna system and 100 watts output.

The 2N3390 transistor shown in the diagram is a high-gain, low-noise, audio-type NPN, but there is no reason why similar transistors cannot be substituted (for example, the RCA SK3245, or equivalent).

Construction

My equalizer was built in a small metal cabinet (Radio Shack Cat. # 270-251) to

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Say You Saw It In CQ

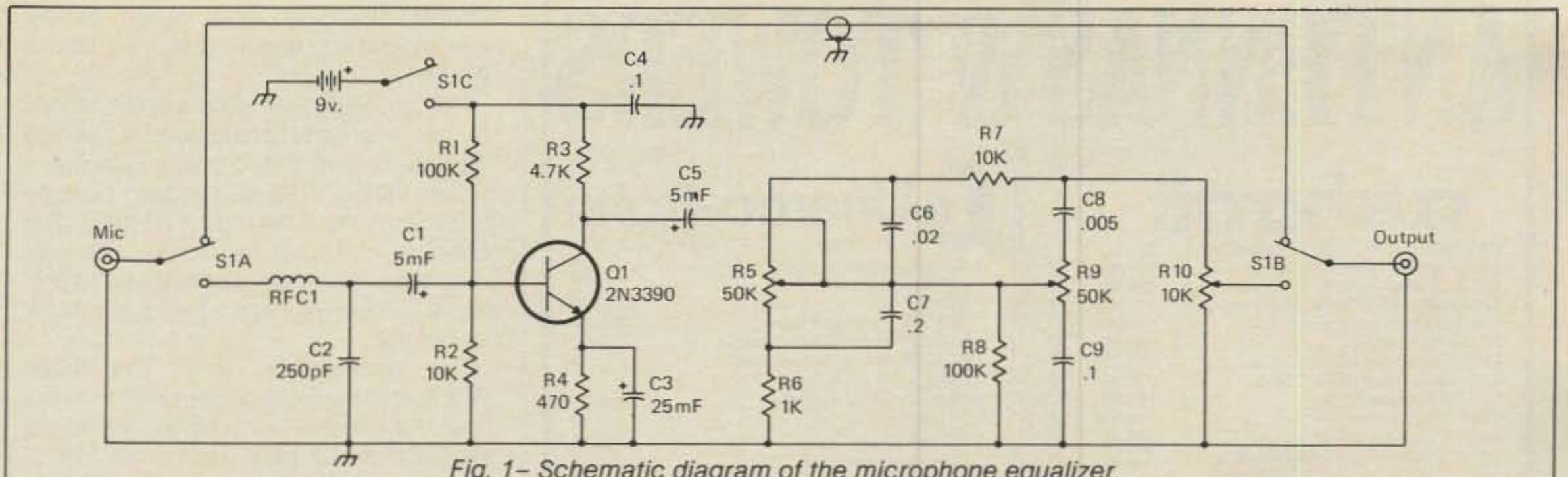


Fig. 1– Schematic diagram of the microphone equalizer.

Rear view of the equalizer. You can add knobs to the controls if you want to.

Parts List

C1, C5 4.7 μF 16 volt electrolytic or tantalum
C2 270 pF 50 volt ceramic or similar
C3 22 μF 16 volt electrolytic or tantalum
C4, C9 .1 μF 50 volt metal film, PC-mount type or similar
C6 .022 μF 50 volt metal film, PC-mount type or similar
C7 .22 μF 50 volt metal film, PC-mount type or similar
C8 .005 μF 50 volt metal film or ceramic
R1 100K ohms ¼ watt
R2 10K ohms ¼ watt
R3 4.7K ohms ¼ watt
R4 470 ohms ¼ watt
R5, R9 50K ohms carbon pot, linear taper
R6 1K ohm ¼ watt
R7 10K ohms ¼ watt
R8 100K ohms ¼ watt
R10 10K ohms, carbon pot, audio taper
S1 3-pole 2-position rotary switch
Q1 2N3390 transistor or equivalent (see text)
RFC1 miniature ferrite-core choke 300-500 μHy (not critical)
Misc. circuit board, cabinet, knobs, battery, hook-up wire, small-diameter shielded wire (RG174U coax), hardware, microphone, output jacks, etc.

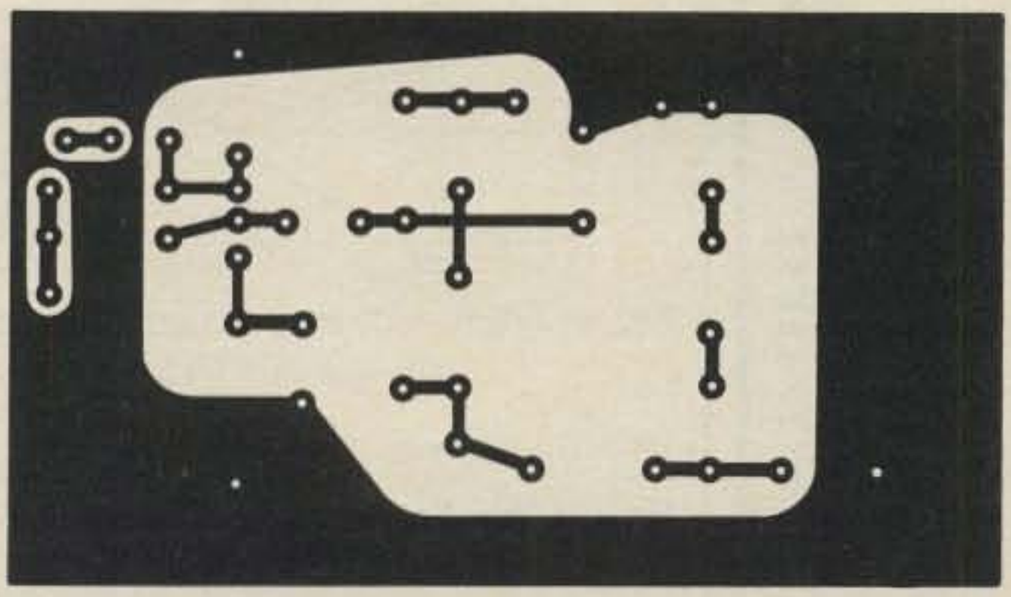


Fig. 2– The equalizer PC board as seen from the foil side. This is shown actual size.

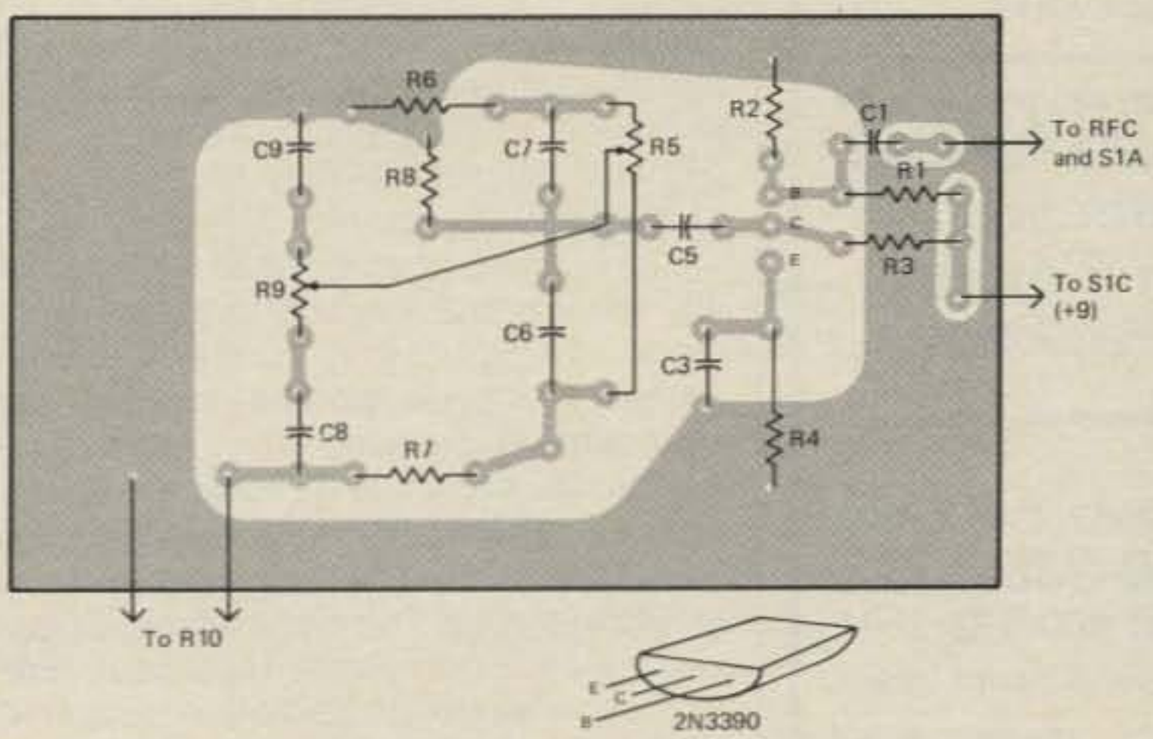
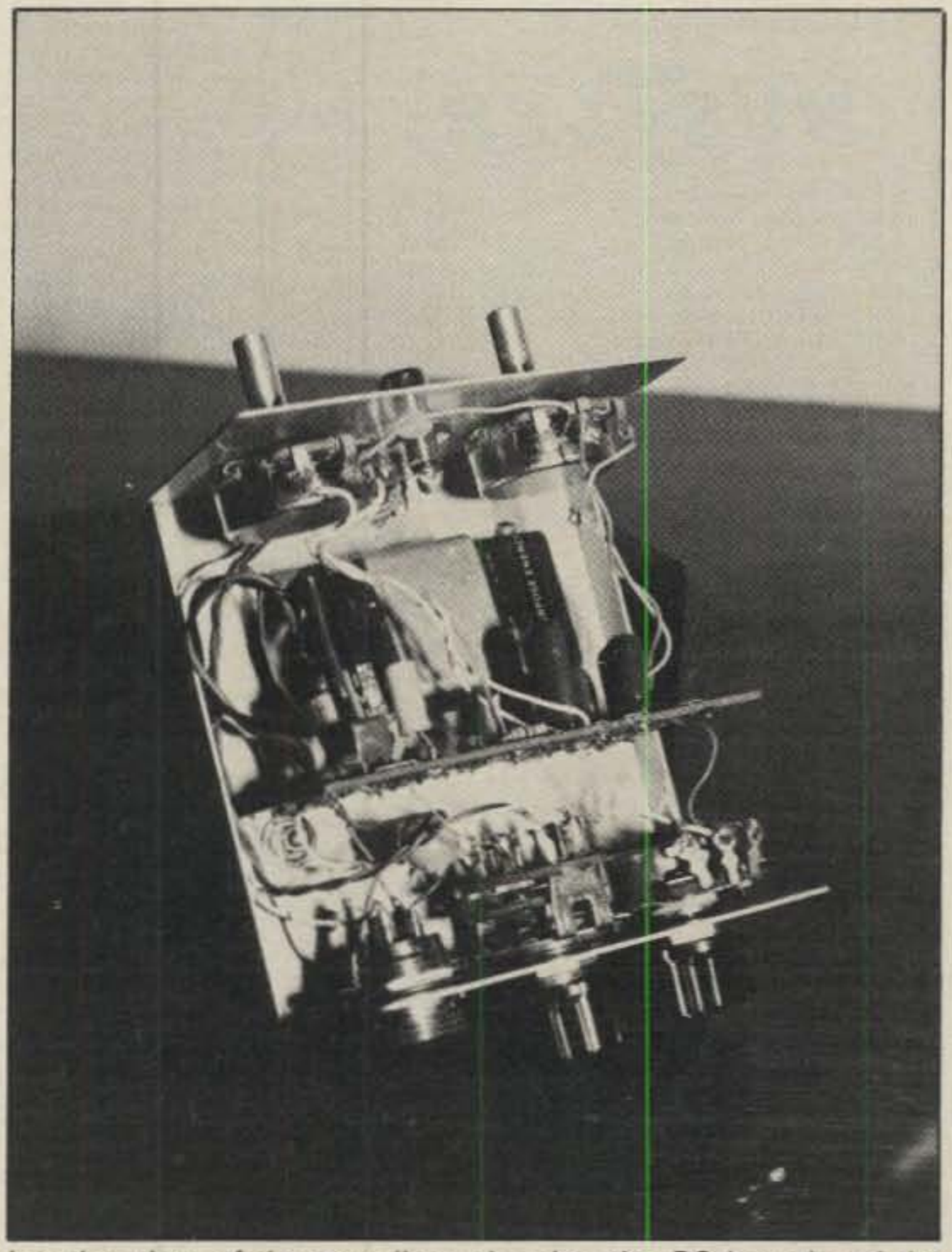


Fig. 3– The PC board shown from the component side. This is also the parts placement.



Interior view of the equalizer showing the PC board and the point-to-point construction.

provide shielding and other conveniences, but any similar metal enclosure will do.

The circuit is quite simple and requires no special precautions. I used a 1¾" by 3" piece of perforated board with point-to-point wiring. A PC circuit board can be made from the drawings if desired. The board is mounted vertically with two small brackets to save space and to provide a good mechanical and electrical connection.

The microphone jack, the **On-Off** switch, and the level or gain control were mounted on the front panel, while the bass and treble pots were mounted on the rear panel. A couple of RCA-type phono jacks—one for the output audio and the other for the microphone push-to-talk circuit—were also mounted on the rear. C1, C3, and C5 are 16 volts electrolytic or tantalum capacitors. C2 and C4 are not mounted on the board, but should be soldered on the foil side with short leads.

The network capacitors—C6, C7, C8, and C9—should be good-quality 10% mylar or ceramic capacitors. The bass and treble potentiometers should be of the linear type; be sure to connect both variable arms together, since only one wire comes from the circuit board. The 9 volt battery should be fastened to the bottom of the cabinet with a metal or plastic clamp to avoid tumbling.

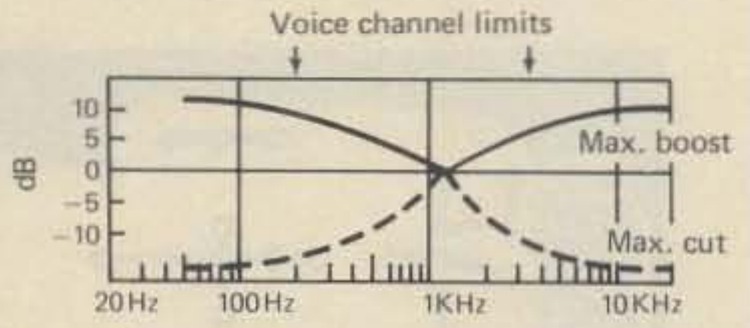


Fig. 4– Frequency response of the microphone equalizer.

Using the Equalizer

Perhaps the best way to evaluate the unit is to get the help of a friend to monitor your test transmissions. If recording capabilities are available, they should be used, and a series of well-documented tests should be made; later you can listen to the recordings and choose the desired settings. Remember that anything done at the receiving end may affect the tests.

The equalizer can be used with almost any phone transmitting equipment of modern design. It may also be used with recording or public-address systems and even with audio equipment. Make sure that all interconnecting cables are shielded to avoid hum or r.f. pick-up and that the level control is set to the proper level.

(Bibliography: *Transistor Manual*, General Electric Co.; *Radio Handbook*, Editors and Engineers; Radiotron designer, RCA; Reference data for radio engineers, ITT.) CQ

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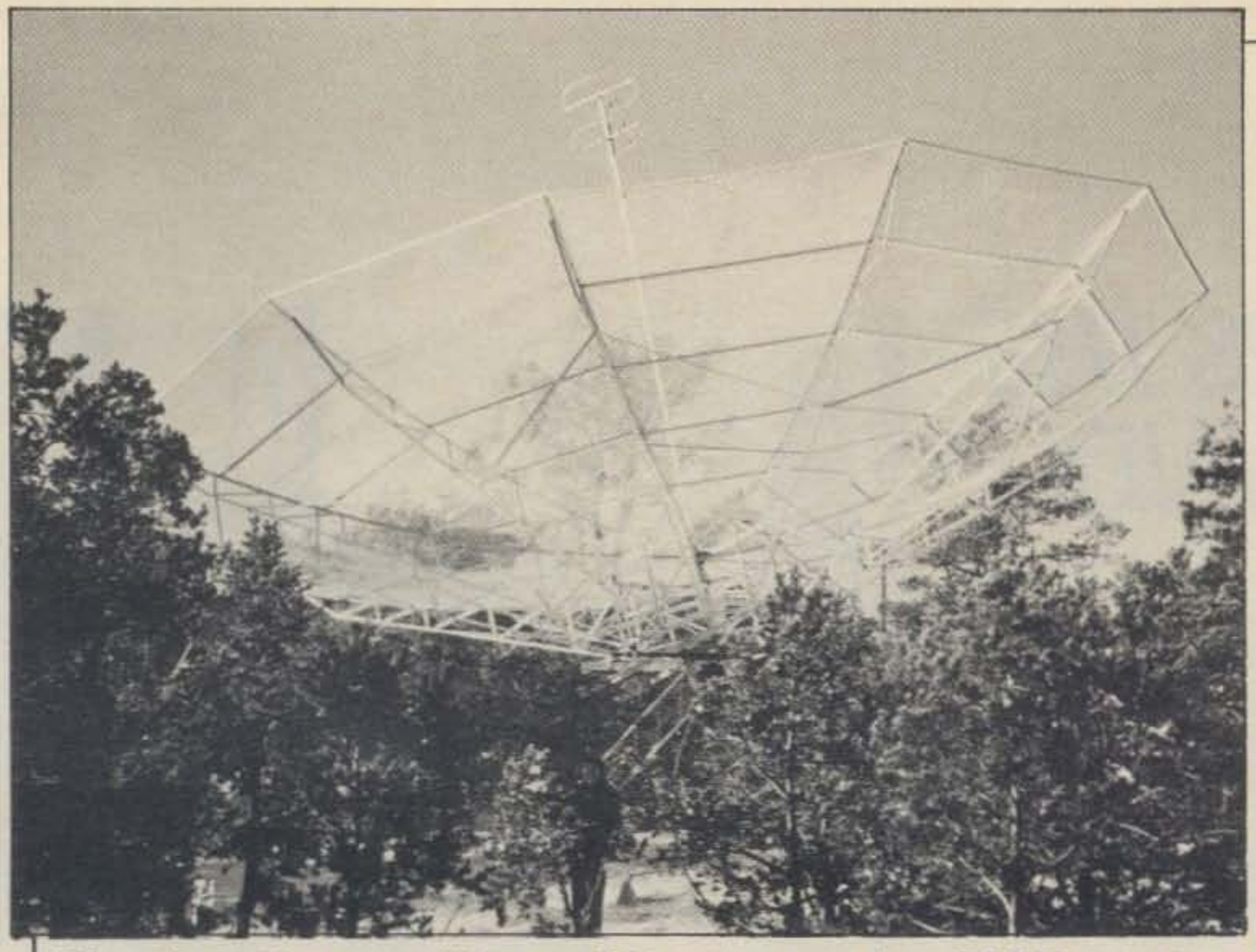

Lee Fish, K5FF, is shown in front of the homebrew 32 foot dish, which is on a polar mount. The feed is for 220 MHz. Fred and Lee fabricated the ribs in their kitchen over one winter.

Plotting the position of the moon for EME contacts can be as simple as entering a program in your computer. Of course, the rest is still up to you.

The "FF" Moon Tracking and Readout Program

BY FRED FISH, W5FF, and LEE FISH*, K5FF

The Fish family has been quite active via moonbounce. Lee, K5FF, has to her credit First YL WAS #23 on 144 MHz, 32 states on 220 MHz, and 35 states on 432 MHz. She also holds a 6 meter WAC and WAS #283 on 6 with 66 countries confirmed. Fred, W5FF, has WAS #24 on 144 MHz, 29 states on 220 MHz, WAS #5, and WAC on 432 MHz. Obviously all the hard work has paid off for this amateur radio duo.—K2EEK

Yes, it *is* possible to make a moonbounce contact by just pointing the antenna array at the visible moon. However, because of frequent cloud cover and the difficulty of accurate visual tracking, this is most unsatisfactory. Most EMEers have a method of ascertaining well in advance the exact position of the moon for any time desired. One way to accomplish this is to purchase a copy of the *Nautical Almanac* for the current year. A better way is to use a computer program such as the one presented here.

The first moonbounce QSO, July 21, 1960, between W1BU (Rhododendron Swamp VHF Society) with Sam Harris, W1FZJ, and W6HB (Eimac Radio Club of San Carlos, California) on 1296 MHz almost failed because the W6HB group was using the simple sighting-tube method, and they found that the moon rose close to the sun, with fog making the visual sighting extremely difficult.

The most used method for moon tracking is to have two rotators, one for azimuth as normally used, and another to tilt the antenna to the desired elevation relative to the horizon (Az-El mount). Another widely used system is the polar mount as used on our homebuilt 32 foot dish, which allows a single rotator to track the moon accurately for the duration of one or more EME contacts.

The Az-El– type mount requires a printout giving the azimuth and elevation coordinates of the moon at intervals of 10 minutes or so, while the operator using a polar-mounted antenna requires the moon's position in **G**reenwich **H**our **A**ngle (**GHA**) and in declination.

For either kind of antenna control the readout can be simple and inexpensive. At W5FF/K5FF a pair of low-priced plastic protractors, which read out to the nearest degree, have served well for hundreds of EME contacts. For a more convenient readout remoted into the shack, a pair of selsyns or a potentiometer readout will have sufficient accuracy if carefully mounted and calibrated.

The program presented here is designed to furnish the information required for either an Az-El array or a polar-mounted antenna. The time interval between successive calculations can be any number of minutes desired. For the advanced moonbouncer, the **R**ight **A**scension (**RA**) is also printed out, so by reference to the appropriate "sky temperature map," the operator can determine how high a background noise to expect.

The "FF" program was written in Level II Basic to run on a TRS-80 Model III. The Basic language used by other models is similar enough so that conversion should not be difficult. If you are already using a Basic program for your EME printouts, it well may be worth your while to enter this one and compare the times required to run each one for a two or three day period. This program is much faster than any of the many others written in Basic that I have used. It includes some simplified coding as well as a few shortcuts.

One of the sacrifices made in the interest of speed limits this program to years between 1901 and 1999. It will not give accurate results for earlier cen-

*P.O. Box 73, Edgewood, NM 87015

Say You Saw It In CQ

MOON DATA FOR W5FF ON 6 / 15 / 1983

GMT	AZIM	ELEV	GHA	DEC	RA
2040	103.1	45.4	61.4	16.5	10.1
2050	105.0	47.3	63.8	16.5	10.1
2100	107.1	49.2	66.3	16.4	10.2
2110	109.2	51.1	68.6	16.4	10.2
2120	111.6	52.9	71.0	16.4	10.2
2130	114.0	54.7	73.4	16.3	10.2
2140	116.7	56.5	75.9	16.3	10.2
2150	119.7	58.3	78.3	16.3	10.2
2200	122.8	60.0	80.7	16.2	10.2
2210	126.3	61.6	83.1	16.2	10.2
2220	130.1	63.2	85.5	16.2	10.2
2230	134.3	64.6	87.9	16.2	10.2

MOON DATA FOR W5FF ON 6 / 16 / 1983

GMT	AZIM	ELEV	GHA	DEC	RA
2130	108.2	41.8	60.6	11.4	11.1
2140	110.3	43.7	63.1	11.4	11.1
2150	112.4	45.5	65.4	11.3	11.1
2200	114.7	47.3	67.9	11.3	11.1
2210	117.1	49.1	70.3	11.3	11.1
2220	119.7	50.8	72.7	11.2	11.1
2230	122.5	52.5	75.1	11.2	11.1
2240	125.4	54.1	77.5	11.2	11.1
2250	128.6	55.7	80.0	11.1	11.1
2300	131.9	57.2	82.4	11.1	11.2
2310	135.6	58.6	84.8	11.1	11.2
2320	139.5	59.9	87.2	11.0	11.2
2330	143.8	61.2	89.6	11.0	11.2

TOTAL 'RUN & PRINT' TIME FOR THE ABOVE: 3 MINS 20 SECS

Moon data for W5FF.

turies. I intend to have an improved and updated version available prior to 2000.

For radio operators not familiar with moon-tracking terms, the following definitions are given:

Azimuth: The bearing of the moon in degrees clockwise from true (*not magnetic*) North, East being 90 degrees, South 180 degrees, West 270 degrees. Used for pointing your antenna in the correct direction, similar to your TV antenna rotator operation.

Elevation: This is the height of the moon at a given time referenced to a horizontal plane with the observer's horizon being 0 degrees, and directly overhead being maximum elevation of 90 degrees. Usually, a second rotator is used which will tilt the antenna upward to the desired angle after the azimuth is set correctly. In order to "track" the moon's movement, it is desirable to update the azimuth and elevation setting at intervals varying from 5 to 30 minutes, depending upon one's antenna pattern and the relative position of the moon.

GHA (Greenwich Hour Angle): This compares to earth longitude in degrees. If your longitude is 75 degrees west and the moon is at its highest point (directly overhead or due north or south of you), the moon's GHA at that time is 75 degress.

DEC (Declination): Similar to earth latitude. Imagine the earth's equator to be extended upward onto the celestial

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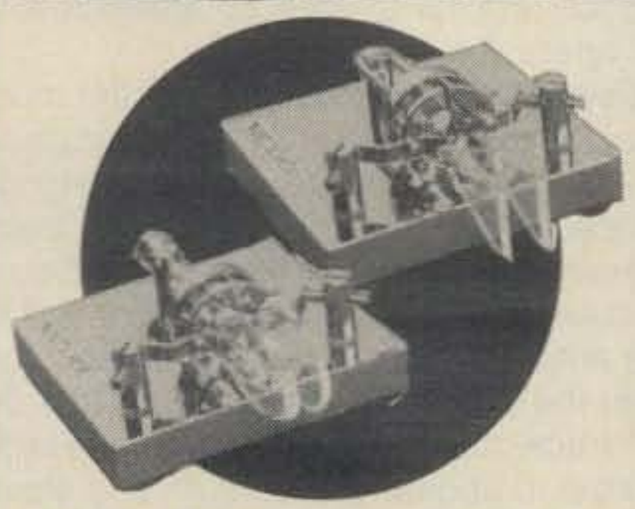

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CIRCLE 57 ON READER SERVICE CARD


```
1Ø '*****************************************************
2Ø '**   MOON LOCATOR PROGRAM "FF" BY W5FF/K5FF   **
3Ø '*****************************************************
4Ø ' THIS PGM OUTPUTS UTC,AZ,EL,GHA,DEC,RA
5Ø DEF FNA(X)=(X-INT(X))*TUPI
6Ø PI = 3.1415925 : TUPI = 6.283185
7Ø DEG = 57.29578 'CONVERTS RADIANS TO DEGREES
8Ø RAD =.Ø1745329 'CONVERTS DEGREES TO RADIANS
9Ø INPUT"ENTER 'DISP' IF NO PRINTOUT IS DESIRED"; D$
1ØØ IF D$="DISP" THEN POKE 16421,7:POKE 16422,115:POKE 16423,4
11Ø INPUT"ENTER STATION CALL LETTERS"; CL$
12Ø INPUT"ENTER YOUR LATITUDE IN FORMAT DD,MM,SS";DD,MM,SS
13Ø LAT = RAD*(DD + (MM + SS/6Ø)/6Ø)
14Ø INPUT"ENTER UR LONGITUDE IN DEGS,MINS,SECS";DD,MM,SS
15Ø LO = RAD*(DD + (MM + SS/6Ø)/6Ø)
16Ø INPUT"ENTER START GHA OF YOUR WINDOW";SG
17Ø SG = SG * RAD
18Ø INPUT"ENTER ENDING GHA";EG
19Ø EG = EG * RAD
2ØØ INPUT "INPUT INTERVAL IN MINUTES"; I
21Ø INPUT"INPUT STARTING DATE IN FORMAT MM,DD,YYYY";M,D,Y
22Ø GOSUB 1Ø4Ø
23Ø BJ = J : AM=M : AD=D : AY=Y
24Ø INPUT"INPUT ENDING DATE (MONTH,DAY,YEAR)";M,D,Y
25Ø GOSUB 1Ø4Ø
26Ø EJ = J : DA = BJ : D = AD : M = AM : Y = AY
27Ø UTC = Ø
28Ø LPRINT:LPRINT"MOON DATA FOR ";CL$;" ON ";M;"/";D;"/";Y:LPRINT
29Ø LPRINT " UTC";TAB(12)"AZIM";TAB(23)"ELEV";TAB(35)"GHA";
3ØØ LPRINTTAB(46)"DEC";TAB(57)"RA":B$="----":LPRINT B$;TAB(12)B$;
31Ø LPRINTTAB(23)B$;TAB(34)B$;TAB(45)B$;TAB(56)B$
32Ø T1 = DA - 17472.5
33Ø ' START MAIN CALCULATION LOOP
34Ø DF = ((UTC-INT(UTC/1ØØ)*1ØØ)+INT(UTC/1ØØ)*6Ø) - 144Ø
35Ø IF DF <= Ø THEN 39Ø
36Ø IF DF-I >= Ø THEN 11ØØ
37Ø UTC = 24ØØ
38Ø ' CALCULATE LATITUDE & LONGITUDE OF MOON
39Ø T2 = (UTC-INT(UTC/1ØØ)*1ØØ)/144Ø+INT(UTC/1ØØ)/24
4ØØ T = T1 + T2
41Ø K1 = FNA(.751213+.Ø366Ø11Ø2*T)
42Ø K2 = FNA(.822513+.Ø362916457*T)
43Ø K3 = FNA(.995766+.ØØ273777852*T)
44Ø K4 = FNA(.974271+.Ø338631922*T)
45Ø K5 = FNA(.Ø312525+.Ø367481957*T)
46Ø L1 = K1 + RAD*(.658*SIN(2*K4)+6.289*SIN(K2))
47Ø L1 = L1 + RAD*(-1.274*SIN(K2-2*K4)-.186*SIN(K3))
48Ø L1 = L1 + RAD*(.214*SIN(2*K2)-.114*SIN(2*K5))
49Ø L1 = L1 + RAD*(-.Ø59*SIN(2*K2-2*K4)-.Ø57*SIN(K2+K3-2*K4))
5ØØ K6 = K5 + RAD*(.6593*SIN(2*K4)+6.23Ø3*SIN(K2)-1.272*SIN(K2-2*K4))
51Ø L2 = RAD*(5.144*SIN(K6)-.146*SIN(K5-2*K4))
52Ø ' CALCULATE RIGHT ASCENSION (R1)
53Ø D1 = COS(L2)*SIN(L1)*.397821+SIN(L2)*.917463
54Ø D1 = ATN(D1/(SQR(1-D1*D1)))
55Ø A1 = (COS(L2)*SIN(L1)*.917463-SIN(L2)*.397821)/COS(D1)
56Ø A2 = COS(L2)*COS(L1)/COS(D1)
57Ø GOSUB 99Ø
58Ø R1 = FT
59Ø ' CALCULATE LOCAL SIDEREAL TIME (LST)
6ØØ LST = .Ø657Ø9822*T1
61Ø LST = T2*24*1.ØØ2738+6.646Ø55+(LST-INT(LST/24)*24)
62Ø LST = (LST-INT(LST/24)*24)
63Ø ' CALCULATE GHA
```

sphere as zero reference. As the moon moves north and south of this equator each month, declination will vary from as much as north (positive) 28 degrees to south (negative) 28 degrees, maximum declination varying with a moon cycle of about 18 years. Unlike the corresponding "elevation" reading used with an Az-El system, declination typically varies only a degree or two over many hours, making tracking much simpler with a polar mount.

RA (Right Ascension): As with GHA, this can be stated in hours or degrees, each hour equaling 15 degrees. It is measured westward much as longitude is measured, only from a fixed reference point in the sky rather than on the earth's surface.

Program Notation

The program will ask for the following inputs:

Line 90: Enter 'DISP' for display only if no hard-copy output is needed. This is often desirable when just looking to see where the moon will be next weekend, etc. Otherwise, hit 'enter' to continue. If it is preferred to always send the output data to the printer, simply delete completely statements 90 and 100 when entering the program.

Line 110: The station call for which the calculations apply. For continued use by only your own station, change this statement to read 110 D$ = "URCALL".

```
64Ø GHA = (LST/24)*TUPI-R1
65Ø IF GHA < Ø THEN GHA = GHA + TUPI : GOTO 67Ø
66Ø IF GHA > TUPI THEN GHA = GHA - TUPI
67Ø IF SG < EG GOTO 7ØØ
68Ø IF GHA > SG OR GHA < EG THEN 78Ø
69Ø IF GHA < SG AND GHA > EG THEN UTC=UTC+I+365*(SG-GHA):GOTO 73Ø
7ØØ IF GHA > SG AND GHA < EG THEN 78Ø
71Ø IF GHA <= SG THEN UTC = UTC + I +365*(SG-GHA):GOTO 73Ø
72Ø UTC = UTC + I + 365*(TUPI-GHA+SG)
73Ø UTC = INT (UTC/1Ø)*1Ø : IF UTC > 24ØØ GOTO 11ØØ
74Ø Z = (UTC-INT(UTC/1ØØ)*1ØØ)-6Ø
75Ø IF Z < Ø THEN 34Ø
76Ø UTC = INT (UTC/1ØØ)*1ØØ+1ØØ+Z
77Ø GOTO 34Ø
78Ø ' CALCULATE ELEVATION
79Ø H = LO - GHA
8ØØ E1 = COS(LAT)*COS(H)*COS(D1)+SIN(D1)*SIN(LAT)
81Ø E2 = SQR(1-(E1*E1))
82Ø EL = ATN((E1/E2)-(1/(61.33*E2)))
83Ø F = ATN(E1/E2)
84Ø IF EL < Ø OR EL > 1.745329 THEN 93Ø
85Ø ' CALCULATE AZIMUTH
86Ø A1 = SIN(LAT)*SIN(D1)+COS(LAT)*COS(D1)*COS(H)
87Ø A1 = SIN(H)*COS(D1)/SQR(1-A1*A1)
88Ø A2 = SIN(D1)/(COS(LAT)*COS(F))-(TAN(LAT)*TAN(F))
89Ø GOSUB 99Ø
9ØØ A$="###.#":LPRINT USING"####";UTC;:LPRINTTAB(11)USING A$;FT*DEG;
91Ø LPRINTTAB(22)USING A$;EL*DEG;:LPRINTTAB(33)USING A$;GHA*DEG;
92Ø LPRINTTAB(44)USING A$;D1*DEG;:LPRINTTAB(55)USING A$;R1*DEG/15
93Ø UTC = UTC+I : IF UTC > 24ØØ GOTO 11ØØ
94Ø Z = (UTC-INT(UTC/1ØØ)*1ØØ)-6Ø
95Ø IF Z < Ø THEN 34Ø
96Ø UTC = INT(UTC/1ØØ)*1ØØ+1ØØ+Z
97Ø GOTO 34Ø
98Ø ' ARCTAN SUBROUTINE
99Ø IF A2 > Ø AND A1 >= Ø THEN FT = ATN(A1/A2) : GOTO 1Ø2Ø
1ØØØ IF A2 < Ø THEN FT = ATN(A1/A2) + PI : GOTO 1Ø2Ø
1Ø1Ø FT = ATN(A1/A2) + TUPI
1Ø2Ø RETURN
1Ø3Ø ' THIS SUBROUTINE RETURNS NUMBER OF DAYS SINCE 1852
1Ø4Ø IF M >= 3 THEN 1Ø7Ø
1Ø5Ø J = 365*(Y-1853)+D+3Ø*(M+9)+INT((M+1Ø)/2)+INT((Y-1853)/4)
1Ø6Ø GOTO 1Ø9Ø
1Ø7Ø IF M = 9 OR M = 11 THEN C = 1 ELSE C = Ø
1Ø8Ø J=365*(Y-1852)+D+3Ø*(M-3)+INT((M-2)/2)+INT((Y-1852)/4)+C-1
1Ø9Ø RETURN
11ØØ GOSUB 114Ø
111Ø DA = INT(DA*1Ø+.5)/1Ø + 1
112Ø IF DA > EJ THEN END  ELSE 27Ø
113Ø ' THIS SUBROUTINE INCREMENTS THE MONTH, DAY, AND YEAR
114Ø IF D < 28 THEN 126Ø
115Ø IF M <> 2 THEN 118Ø
116Ø IF Y <> 4*INT(Y/4) THEN 123Ø
117Ø IF D < 29 THEN 126Ø  ELSE 123Ø
118Ø IF D < 3Ø THEN 126Ø  ELSEIF D > 3Ø THEN 12ØØ
119Ø IF M = 4 OR M = 6 OR M = 9 OR M = 11 THEN 123Ø  ELSE 126Ø
12ØØ IF M < 12 THEN 123Ø
121Ø Y = INT((Y+1)*1ØØ+.5)/1ØØ
122Ø M = Ø
123Ø D = 1
124Ø M = M + 1
125Ø GOTO 127Ø
126Ø D = D + 1
127Ø RETURN
```

Lines 120 and 140: If your location is not known with accuracy down to a few seconds, enter DD,MM,ØØ. Output will be precise enough for use by amateur stations. As in 110, for use at only one location, use the following format:

120 DD = 34 : MM = 59 : SS = 15 (using your Latitude)

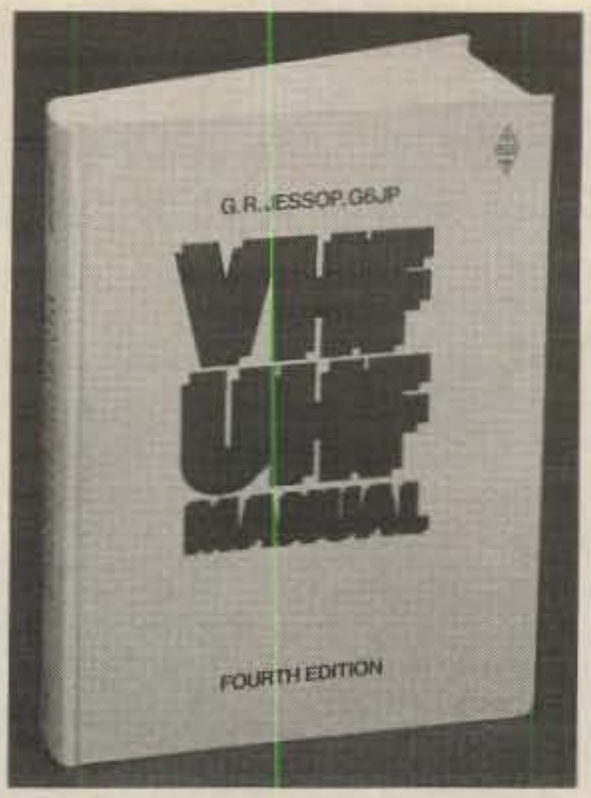
140 (Same as above, using your Longitude)

Lines 160 and 180: Enter starting and ending GHA's desired. If you are not yet familiar with your window in GHA, enter a start GHA of your longitude minus 90 degrees and an ending GHA of your longitude plus 90 degrees. If either result is negative or greater than 360, add or subtract 360 so that the result is within the range 0 to 360 degrees. Depending upon your latitude and the moon's declination, this will output approximately from moonrise until moonset.

Line 200: For operation on 144, 220, or 432 MHz, calculations at 10-minute intervals are adequate for most cases. If you decide to use this interval, enter:

200 I = 10.

Lines 210 and 240: These statements may be left as is, although if you do not mind changing the program with each new year, the current year can be coded into the program so that only a month and day need be input each time a run is made. CQ



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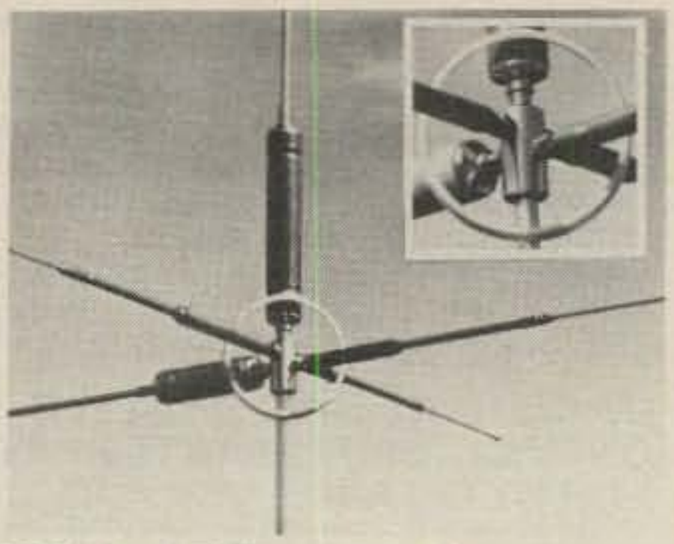

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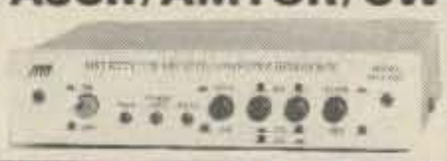

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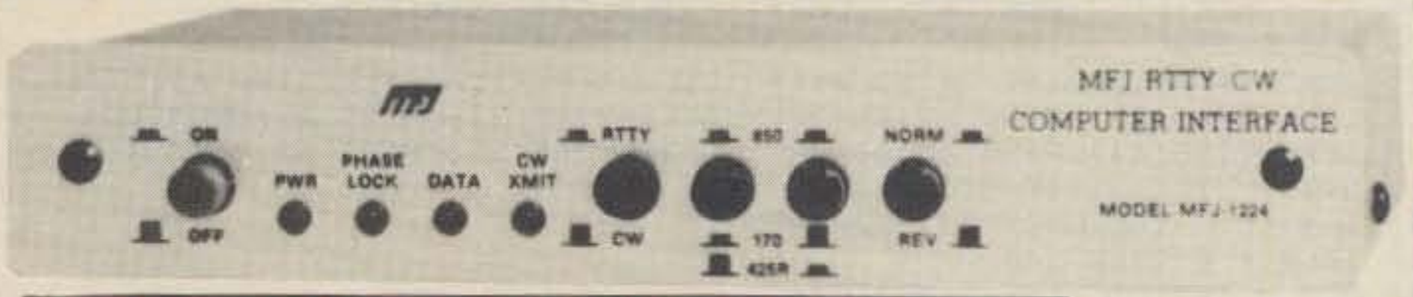

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CIRCLE 126 ON READER SERVICE CARD

Here is another approach to operating your HT in the car. Provide an emergency back-up power source and keep your regular battery pack charged.

Construct a Dual-Purpose ICOM HT Battery Pack

BY STEVEN B. JOHNSTON*, WD8DAS

The ICOM IC-2, 3, 4AT series of hand-held transceivers has proven to be a line of rugged and versatile rigs. These radios offer reliable performance as well as a family of accessories, among which are the removable battery packs. The ability to change packs in the field makes hand-held operation as trouble-free as one could expect. No longer does an operator have to go off the air when the batteries are dead. Rather, a freshly charged pack can be carried along and slipped on the rig quickly and easily. The worth of this option is demonstrated by the number of other manufacturers adopting this feature on their new handhelds.

Another accessory of merit to the ICOM owner is called the DC-1, which allows operation from the car electrical system. Many IC-2, 3, 4AT owners use their handhelds as mobile rigs. The DC-1 consists of a cigarette lighter plug and a regulator unit substituted for the normal battery pack. The DC-1 is not an inexpensive item, and some amateurs may not want to pay the price for such a simple piece of equipment. To meet this dilemma, a number of ICOM owners have taken the less-expensive BP-4 battery holder and converted it to operate as a car adapter. The BP-4 is an empty holder which can be loaded with six alkaline or NiCad batteries, but which has no charging jack as on the other packs offered by ICOM for use with their HT's.

The BP-4 conversion is not completely satisfactory since its original function as a spare battery pack is sacrificed and the construction of the circuit to mimic a DC-1 is simple enough so as not to require all the space in a BP-4. To retain the battery pack utility as well as create a car adapter is possible and easy with the BP-4 holder.

*2067 19th St. S.W., Akron, OH 44314

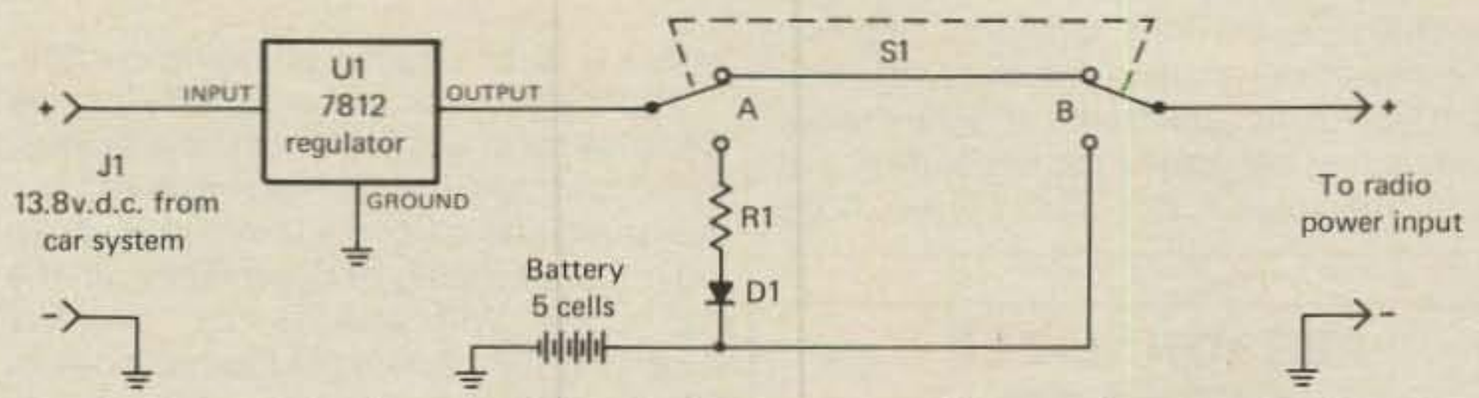

Fig. 1– Schematic diagram of the dual-purpose supply setup for use with NiCads.

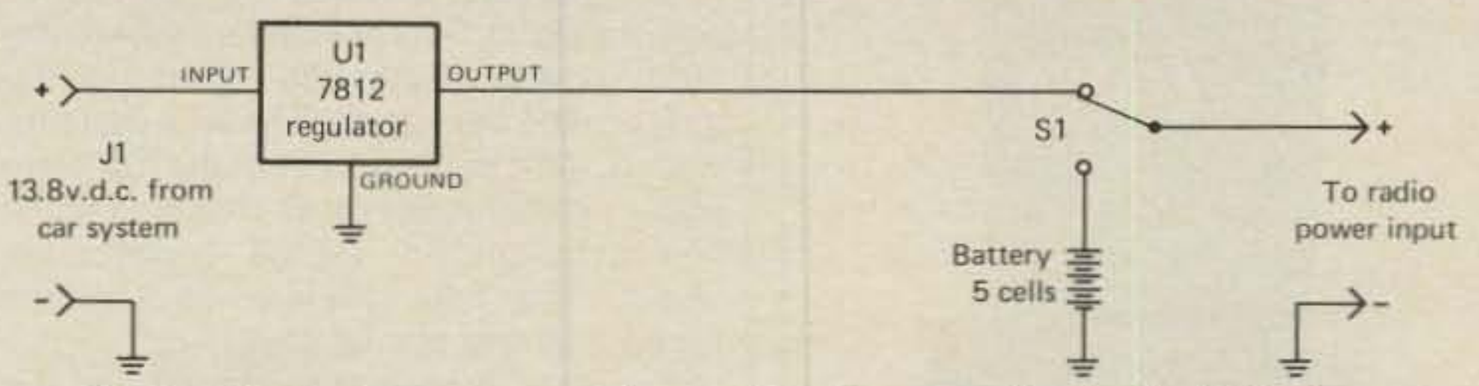

Fig. 2– The dual-purpose supply as set up for use with alkaline batteries.

The circuit needed to regulate the d.c. input from the car electrical system is of few parts and can be compressed into the space taken up by one AA battery. By reducing the number of cells in the BP-4 to five and installing a power input jack, a toggle switch, and necessary circuitry in the space made available, a dual-purpose pack can be built. This allows operation from the automobile for indefinite periods at increased transmitter output (due to higher input voltage) *and* portable operation on the batteries in the pack at reduced transmitter output.

With the dual-purpose pack one can keep the NiCads charged from the car's electrical system and operate while mobile without discharging them, as well as roam away from the car with power supplied by the internal batteries.

Construction

Building the dual-purpose pack is not difficult, and all parts other than the BP-4 holder can be found at Radio Shack. The first step is to determine how the pack will be used—with NiCad batteries or alkalines? The circuit for use with NiCads is shown in fig. 1, and the arrangement for the alkaline pack is shown in fig. 2. Of course, no provision for charging the alkalines can be made, but d.c. operation is provided.

Next, gather the parts required for the version selected and clear your bench of the ever-present debris from other projects, as some of the BP-4 parts are quite small and easily lost. To reduce the BP-4 from six-cell to five-cell operation, solder a small-gauge wire between the contacts intended for the top battery of the back side of the pack. This is the battery slot closest to the radio side of the pack. To distinguish between front and back, note that the front has both the name plate and the top contact plate attached, while the back is plain.

Take a look at the BP-3 battery pack that came standard with your handheld. Note where the coaxial input jack is located; this is the same spot where one is to be mounted on the BP-4 rear. Also note the location of the LED on the rear of the BP-3; this is the spot where the toggle switch is to be fitted on the BP-4. Mark the location of the required holes on the inside of the BP-4 rear shell and drill to size. Keep in mind that more components will be located in the top AA battery slot: a three-pin chip, a diode, and a ½ watt resistor. There must be room for these parts after the jack and switch are mounted.

After installing the toggle switch and coaxial jack, wire the regulator chip into the circuit and position it between the bottom side of the jack frame and the divider plastic that separates the top battery slot from the middle slot. The series diode prevents current from flowing backwards when not charging. The series resistor is required for the NiCad version of the dual-purpose pack, and its value depends on the desired charging rate. I chose a 100 ohm, ½ watt resistor, which limits the charging current to about 50 ma. This value was specified by the batteries I had on hand as the slow charge current recommended by the manufacturer. This rate of charge would be satisfactory for full charging after about 15–16 hours. The formula for determining the value of R1 is

$$R1 = \frac{5.3}{I_S}$$

where I_S is the desired charging current.

The toggle switch is DPDT for the NiCad version and SPDT for the alkalines. In the first case it switches the input to either the batteries or the radio, thus allowing either charging or operation from the car supply. With alkalines, S1 chooses supplying the radio from the batteries or the car input.

The center pin on the top plate of the pack is connected to the toggle switch in both versions. This is to select where the radio receives its power—from the batteries or the car supply. The wire that previously went to the center of the top plate now runs to the switch as shown in fig. 3. The detail of the switch connections shown in fig. 3 are split into two diagrams for each of the two versions.

It is very important to insulate all the connections from each other, and particularly from the top plate, which is ground. If the batteries are shorted to ground, large amounts of current will flow, melting wires and their insulation. In addition, stranded wire should be used to allow for the flexing as the two halves of the pack are opened and closed.

Once assembly has been completed, test the pack with a bench 12 v.d.c. supply to ensure that operation from external sources will be possible. If your NiCads are charged, you immediately can determine if operation from batteries is also in good shape. Otherwise, leave the switch in the battery position and keep the bench supply connected so as to charge the battery pack. Of course, if you are using alkalines, both of the functions of the pack can be tested right away.

In the car a number of connections to the electrical system are possible. A popular idea is to secure a cigarette lighter plug and make a cable to fit between the lighter and the coaxial jack on the modified BP-4. This method allows the handheld to be switched between different cars, but entails the use of cigarette lighter plugs, which are not always of the highest quality or reliability. I chose to hardwire a line into the fuse block of the car with a plug to fit the coaxial jack on the pack. These plugs are available from Radio Shack, as are the jacks. In both cases the package offered contains two jacks and two plugs. The difference between the two jacks in each package is the diameter of the center pin. I recommend using the smaller of the two, since this is the one used by ICOM on their equipment. Plugs are available to fit both sizes.

There are compromises in this conversion, as in all such projects. The new 5-cell battery pack produces only 6 volts nominally, and this is fairly close to the bottom line on which the ICOM can still operate reliably. In my experience the five-cell pack is adequate for emergency situations in which you must leave the car for short periods and have no more powerful pack on hand. The lower input voltage also causes the transmitter power output to be lower than with any other pack. Remember that you would have no power at all if you had only a DC-1 and your other packs were dead. The modified BP-4 described gives the best of both possible worlds in one package. CQ

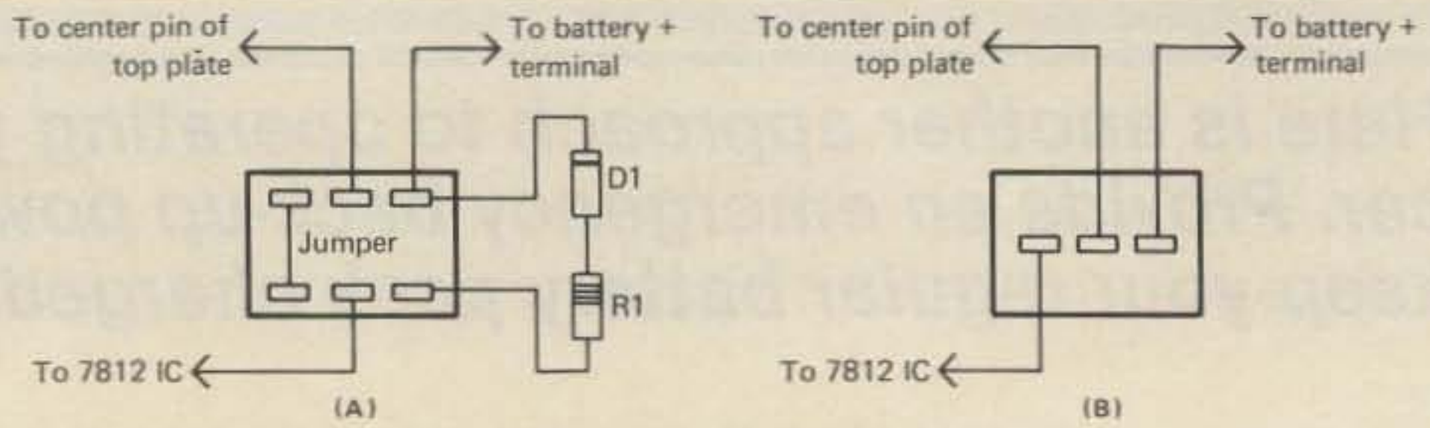

Fig. 3– (A) Switch details for NiCad version. (B) Switch details for alkaline version.

Parts List

J1 – coaxial-type power jack (Radio Shack cat. #274-1549)
P1 – coaxial-type power plug to mate with J1 (Radio Shack cat. #274-1579)
R1 – series charging resistor, value selected for desired charging current (see text)
S1 – DPDT or SPDT as required for particular version (see text) (Radio Shack cat. #275-625 or 626)
U1 – voltage regulator IC in TO-220 package, type 7812 (Radio Shack cat. #276-1771)
D1 – silicon diode, type 1N4001 (Radio Shack cat. #276-1101)
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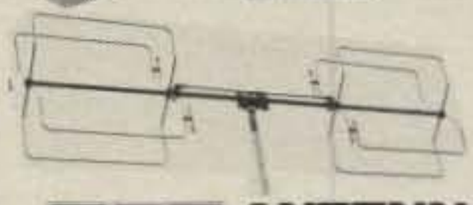

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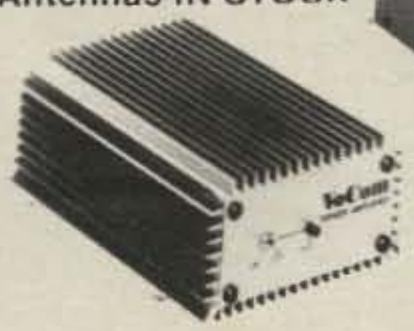

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A Flexible Tape Antenna For 2 Meter HT's

BY MATT MAGGIO*, N4GSV

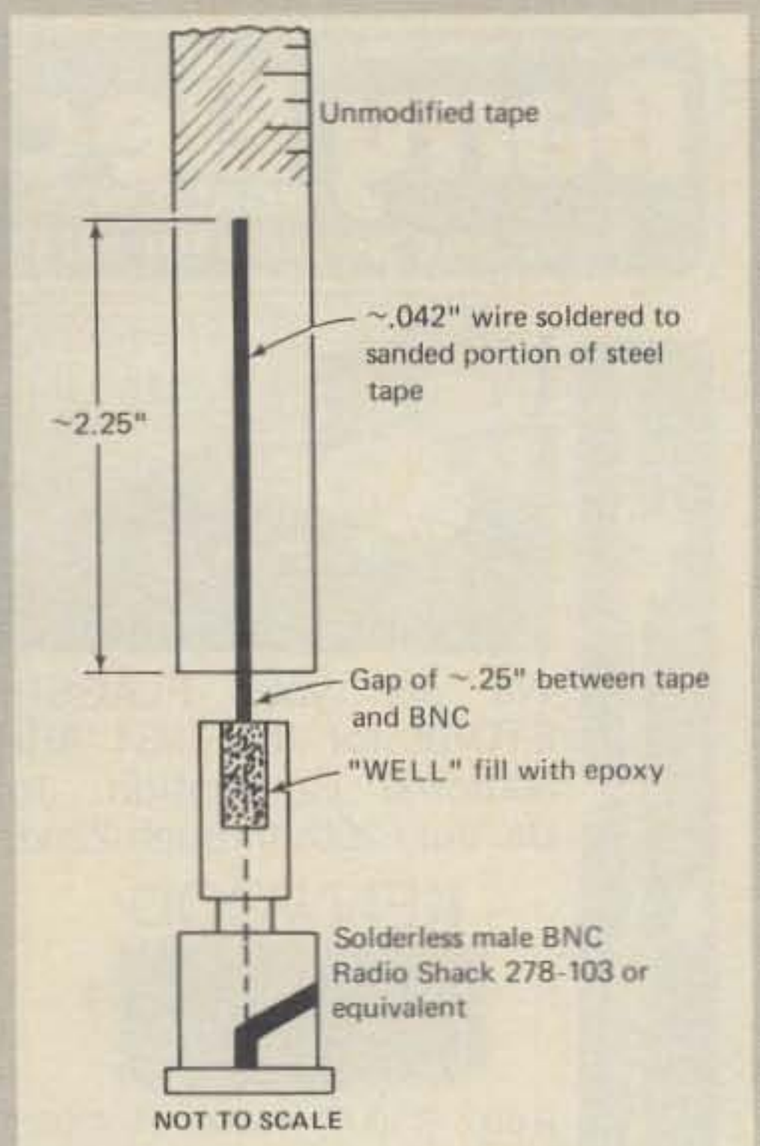

Fig. 1– Preparing the tape antenna and connector.

New users of 2 meter handhelds soon discover that the mechanical convenience of the "rubber duck" antenna that comes with the rig is achieved at a high cost in its electrical performance. When they seek a replacement antenna that will provide superior performance in accessing distant repeaters and in extending simplex range, they find that the commercial market offers only telescoping quarter-wave and ⅝-wave antennas; these do offer far better electrical performance, but at the cost of mechanical weakness and inconvenience. The buyer of a ⅝-wave model will find that it is virtually impossible to use the antenna indoors; both it and the shorter quarter-wave models are easily damaged by accidental contact with low branches (or by being sat on in a car). As a mechanical matter, telescoping antennas are far more suitable for uses such as television "rabbit ears" than for uses in which they will be extended and retracted frequently; when grit or lint inevitably gets between sections, the antenna becomes difficult to collapse without bending, or it loses the electrical advantages that led to its purchase due to the failure of the contact between sections (or due to increased s.w.r. from incomplete extension). Homebrew fixed-length quarter-waves consisting of the appropriate length of wire combined with a male BNC connector provide both durability and electrical performance, but they lack the duck's mechanical convenience.

Although an antenna that combines the electrical performance and durability of the fixed-length quarter-wave with nearly all of the mechanical convenience of the duck is not now commercially available for 2 meter handhelds, one can easily build an antenna that solves the above problems in the same manner as that used by the U.S. armed forces for their low-band portable radios. The following design requires only common hand tools for construction; all specified parts are easily found in the typical suburban shopping center. The cost of building this antenna is less than the $7.00 to $10.00 price of most telescoping quarter-waves.

Construction

The first step in building this antenna is to find a steel tape measure that is stiff enough to stand unsupported for at least 19 inches. I used the Great Neck "850 Y"; this 8 foot tape measure sells for less than $2.50 in a local drugstore, has a tape approximately ½ inch wide, and is coated with a durable, yellow finish which makes the antenna easier to see. (If you cannot find this particular measure, any with a tape not wider than ½ inch will suffice if it can hold itself straight both vertically and horizontally for 19 inches; make sure that it will spring back to straightness if it is bent from an approximately vertical position. The tape should be coated to provide corrosion resistance; a bright yellow color is desirable for safety reasons. Price is no guide to suitability.)

Cut off the first 19 inches of the tape; this may be done with ordinary scissors, although a paper cutter makes the task easier. Using two pairs of pliers, fold the end tab over the tape; the bent tab should then be crimped tightly around the end of the tape. Using fine sandpaper, remove the paint from both sides of the tape in the portion from the "17¼" position to the cut end.

Obtain a solderless male BNC connector, such as the Radio Shack 278-103 that I used, and a short length of stiff steel wire that will firmly fit the hole in the connector that is normally reserved for the coax's central conductor when inserted from above. (The wire used must be either straight or capable of being straightened. I used a wire of approximately 0.042 inch diameter which is sold by hobby shops for use as wheel struts on flyable model airplanes; this wire is straight as sold.) Insert the straight wire into the hole from above, and push until it reaches a definite stop. Cut off the wire at a point approximately 2.5 inches above the top of the connector. Hold the steel tape in the position shown in fig. 1, and mark the point where the exposed portion of the wire ends. Remove the wire from the BNC connector, and hold it in the center of the concave side of the tape with a pair of pliers placed as near as possible to the unsanded portion of the tape. Solder the wire into place; after this assembly cools, make sure the unsoldered portion of the wire is clean.

Reinsert the free end of the wire into the connector, pushing until it reaches a firm stop (as before). A gap of approximately ¼ inch should now exist between the bottom of the tape and the top of the connector as shown in fig. 1. Mix a small amount of epoxy putty (the "mix-in-your-hand" type sold at drugstores is fine) and fill the "well" at the top of the connector as shown by pressing small pieces of putty into place from all sides until no more can be inserted.

2232 Canterbury Dr., Burlington, NC 27215

Find a plastic tube of approximately 0.625 inch internal diameter; it need only be approximately 2.25 inches long. (A CPVC pipe coupler—the type made from rigid white plastic—would be ideal.) Roughen the inner surface of a 2.25 inch piece of the tube with sandpaper, and then hold it in the position shown in fig. 2; the bottom of the tube must be just above the top of the BNC connector's slot. (On the Radio Shack connector specified, the bottom of the tube should be even with the bottom of the connector's fluted grip ring.) Fill the gap between connector and tube with small pieces of putty as shown, making sure that the connector is centered in the tube and totally surrounded with epoxy. Fill the top half inch of the tube with epoxy by pushing one ball of putty (of approximately the same diameter as the tube) down each side of the tape at the tube's opening, and then mold putty around both sides of the first inch of exposed tape as shown in fig. 2. Check the base of the tube to make sure that it has not slipped during this phase; if it has shifted down, push it back into its original position, and smooth the putty at both ends with your fingers. Be certain that no putty is in the BNC connector's slots (or the round gap on its bottom where the handheld's connector's outer shell will fit); any epoxy in these areas must be removed with a toothpick. Set the antenna aside until the epoxy hardens.

(If you used a semiflexible tube—such as one made from polyethylene—wrap two turns of No. 16 galvanized wire around it at a point ⅛ inch above the bottom of the tube after the epoxy has hardened. Twist the wire tight, as if it were a "twist-tie" for a trash bag; tighten it further with pliers—one or two turns more. Cut off the excess wire ½ inch from the tube, and bend that half inch of wire flat against the tube. Bind the wire to the tube by tightly wrapping it with several turns of plastic electrical tape, or use appropriately sized heat-shrink tubing. The difficulty inherent in achieving a strong adhesive bond with these plastics makes this additional step necessary if they are used.)

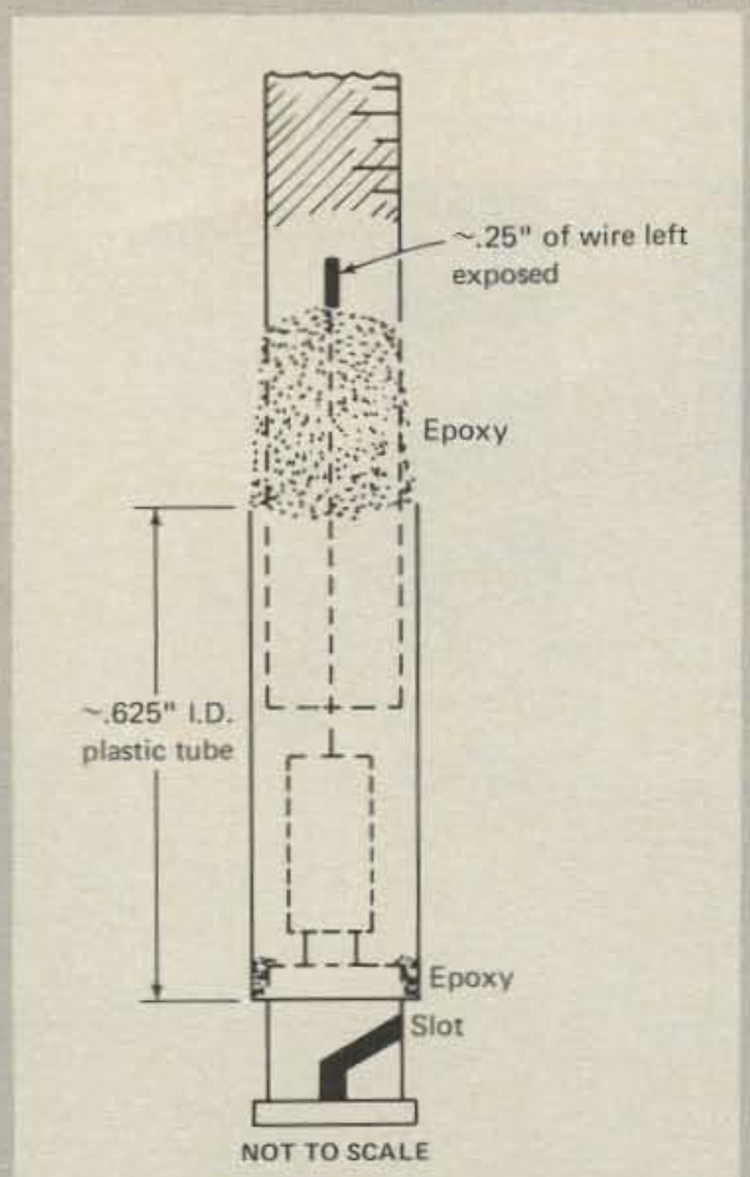

Fig. 2– The tape antenna support system.

Operation

By replacing your handheld's duck with this antenna, you will improve your signal by 3 to 6 dB. At my location this improvement meant that I could access (nearly full quieting) a repeater in an adjoining county that I could not even bring up with the duck; I could also get into an even more distant repeater well enough for conversation. The tremendous increase in simplex performance is particularly valuable in emergency operations, especially when combined with this design's durability and convenience.

When not using the antenna, one can fold it up and put it in a coat pocket. It can be rolled up and placed in a small "Zip-Loc" bag that will easily fit into a shirt pocket. When monitoring local repeaters with an ICOM IC-2AT (or if the set is off), the tape can be bent over behind the radio, with the end tab hooked through the slot in the handheld's belt clip and the radio stood on its battery pack. Its total height this way is only about 2 inches more than with the duck, and the tape can be unhooked quickly to transmit.

Conclusion

A similar antenna could easily be made for the 220 MHz band by changing the length of the tape to an appropriate value; the same is true for the "v.h.f.-high" public-service band. The antenna as built above may be used with handhelds having SO-239 output connectors by inserting an adapter (such as the Radio Shack 278-121) between antenna and radio.

The 2 meter version described above is also an ideal antenna for use with a v.h.f. "pocket" scanner having a BNC input. With the addition of appropriate hardware providing a right-angle bend and adapting the output to the Motorola jack normally used on home scanners, the 2 meter antenna would also be an excellent alternative to the damage-prone telescoping whip usually provided; such an arrangement is easily made by "chaining" parts such as Radio Shack parts 278-121, 278-199, and 278-208.

The cost of this antenna can be reduced by using the remainder of the tape measure to make others; if this is done, be sure to provide a safe tip for the top end by epoxying a wrap-around plastic or metal tip without sharp edges to one end of the tape for each antenna; first sand the paint off of the area to be cemented.

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How To Build a Quick and Easy 432 MHz Helix For OSCAR 10

BY E. BYRON LINDSEY*, W4BIW

If you are an Oscar 10 enthusiast, and if on some rainy weekend you have a hankering to build something on your own, this 435 MHz helix uplink antenna might be just what the doctor ordered.

It can be done in either one or two stages: (1) 6-turn moderate-gain helix; (2) 12-turn high-gain helix. First, the 6-turn "shorty" model will offer only moderate performance, but will fit into some rooms, the attic, or patio, etc., and provide good results when the bird is in a favorable location—especially when using c.w. Then, if you want more gain as I did later on, you can just add 6 more turns on an identical wooden frame which may be bolted to the original frame, and presto! You have tacked on what I call a "gain extension," which will give the needed dB's to equal, and even sometimes surpass, commercial-type crossed dipoles. A big plus is the ability then to say you are using a "homebrew" antenna, even though you may be an appliance operator most of the time these days, as I am.

But back to the original 6-turn job. I wound it in my basement in just two evenings while it was raining. When I finished, it was still raining, so I decided to give it a try right where it was. Sure enough, I could hear my signal coming back down pretty well. You know the next part of the story. I just had to try a couple of QSOs right then and there. I worked a couple of c.w. stations and got RST 5-3-9 and 4-4-9 right up through the basement ceiling, the bed upstairs, and out the roof! A multi-dB pad! This proved to me that some of my friends who live in apartments and condos need not be denied the pleasures of working Oscar 10. They don't know what they are missing.

*1356 Vistaleaf Drive, Decatur, GA 30033

The 6-Turn Helix Construction

After brief research, I started out with about 210 inches of wire or copper tubing in my imagination mounted on a wooden frame to be about 5 feet long and 8¾ inches wide. However, that would be an 8-turn helix, so I scaled down to a starting winding of 175 inches on a frame 4 feet long by 8¾ inches wide for the 6-turn "shorty" model. However, the copper tubing was not too available and would not be insulated, so I decided to use this brand-new type 9913 Belden coax for the spiral. I was already using it to feed my other beams and was familiar with the rigidity of it. It is semi-flex stuff and has a vinyl covering, of course. The inner conductor was soldered to the outer shield at both ends and epoxy was applied.

I used a well-varnished wooden frame and stapled the coax spiral to it. You can see from the photographs that this frame is bolted to a 1 × 4 board via a single large bolt. This permits elevation adjustments to be made via "Armstrong" methods. Likewise, the 1 × 4 board is attached to a pipe driven in the ground by two loosely coupled U bolts. This permits azimuth adjustments to be made, also by the "Armstrong" method. There is nothing wrong with using manual AZ-EL adjustments on Oscar 10 antennas. You only need to change them about once every two hours.

The foundation for the ground plane is

The author "sighting" in via the "Armstrong" method.

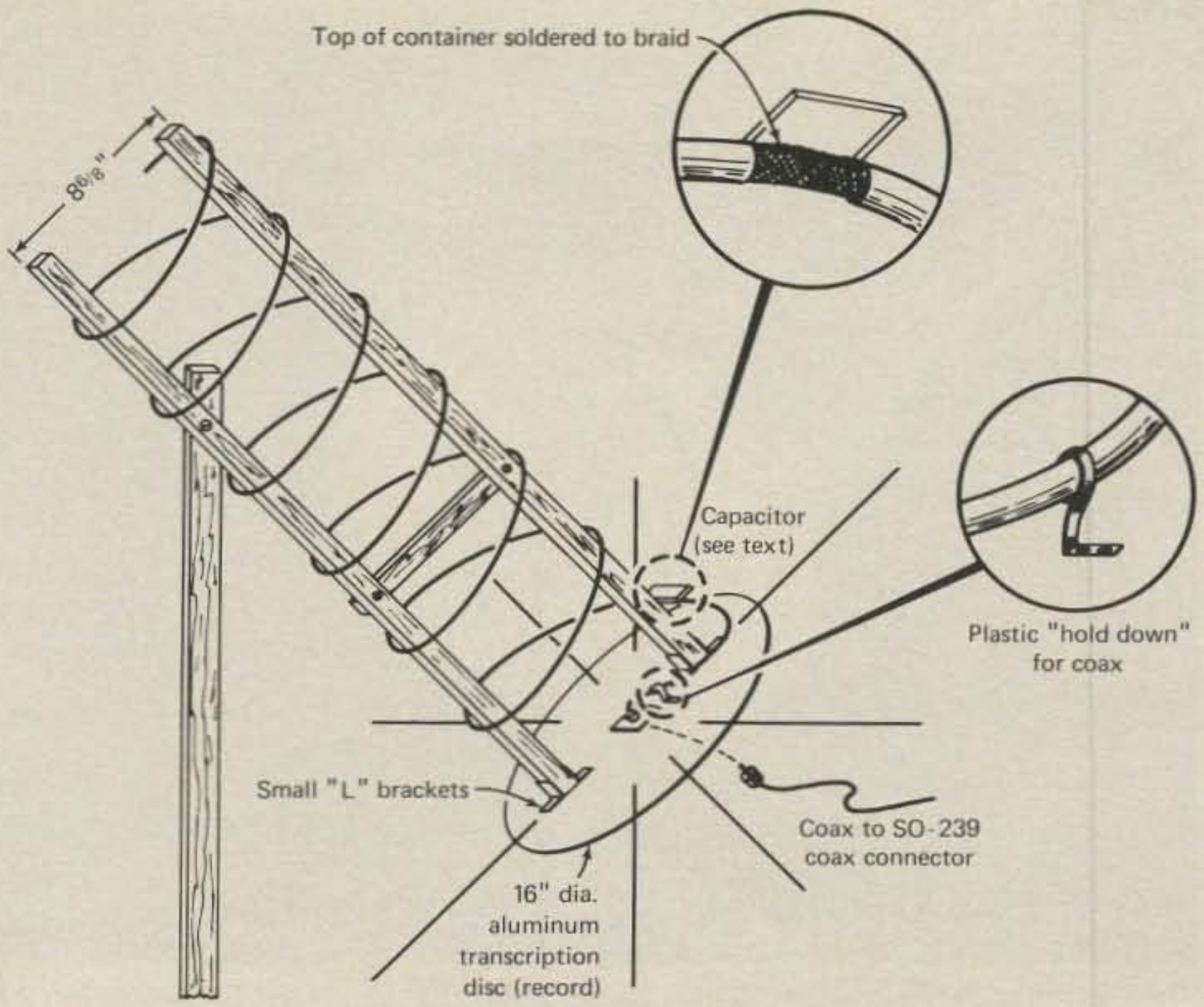
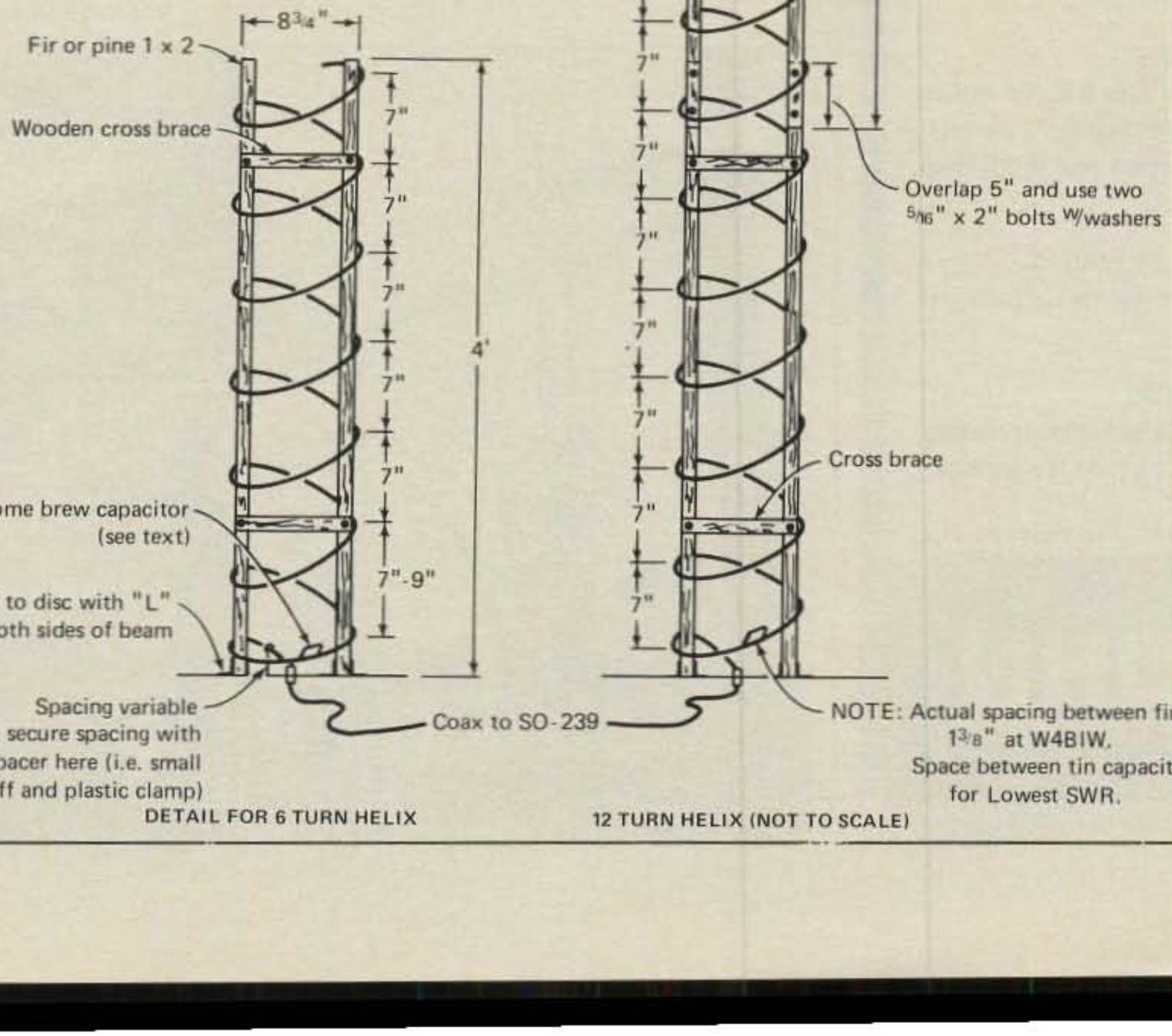


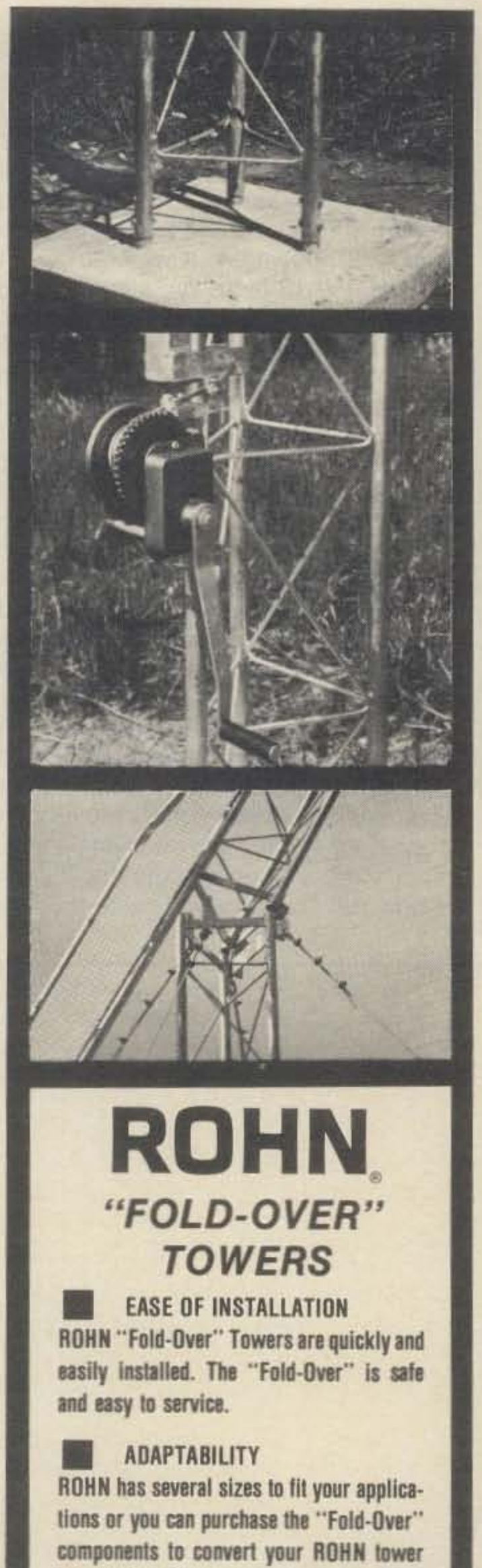
Fig. 1– The 6-turn "shorty" model. The construction is simple and straightforward.

an old 16 inch aluminum disc transcription obtainable from any older radio station. The acetate coating may be removed by soaking it in very hot water. The stuff then peels off readily, and leaves a nice shiny surface with a hole already started in the center for the SO-239 connector. (I might have liked another location for it, but there it was, so . . .) Of course, the 16 inch disc alone is hardly enough surface for the reflector, so I bolted 8 aluminum radials to it. Actually, more radials would be desirable, but this arrangement seems to work okay, so as some people say, "Don't fix it if it ain't broke." I must admit that it looks better and has less wind resistance than the usual copper screen types I have seen.

I would recommend 9913 type coax to feed any rotatable antenna at 435 MHz, but you will find the large center conductor unsuitable for type N connectors. Therefore, the use of so-called u.h.f. connectors is better, I think. Those purists who still may want to use type N may file down the big center conductor and do so, but the result will be rather weak mechanical mating between the coax and the connector. I chose to use the PL-259, since mine is an uplink antenna. If it were a downlink helix, I realize that the impe-

Fig. 2– Details for the 6- and 12-turn helix.





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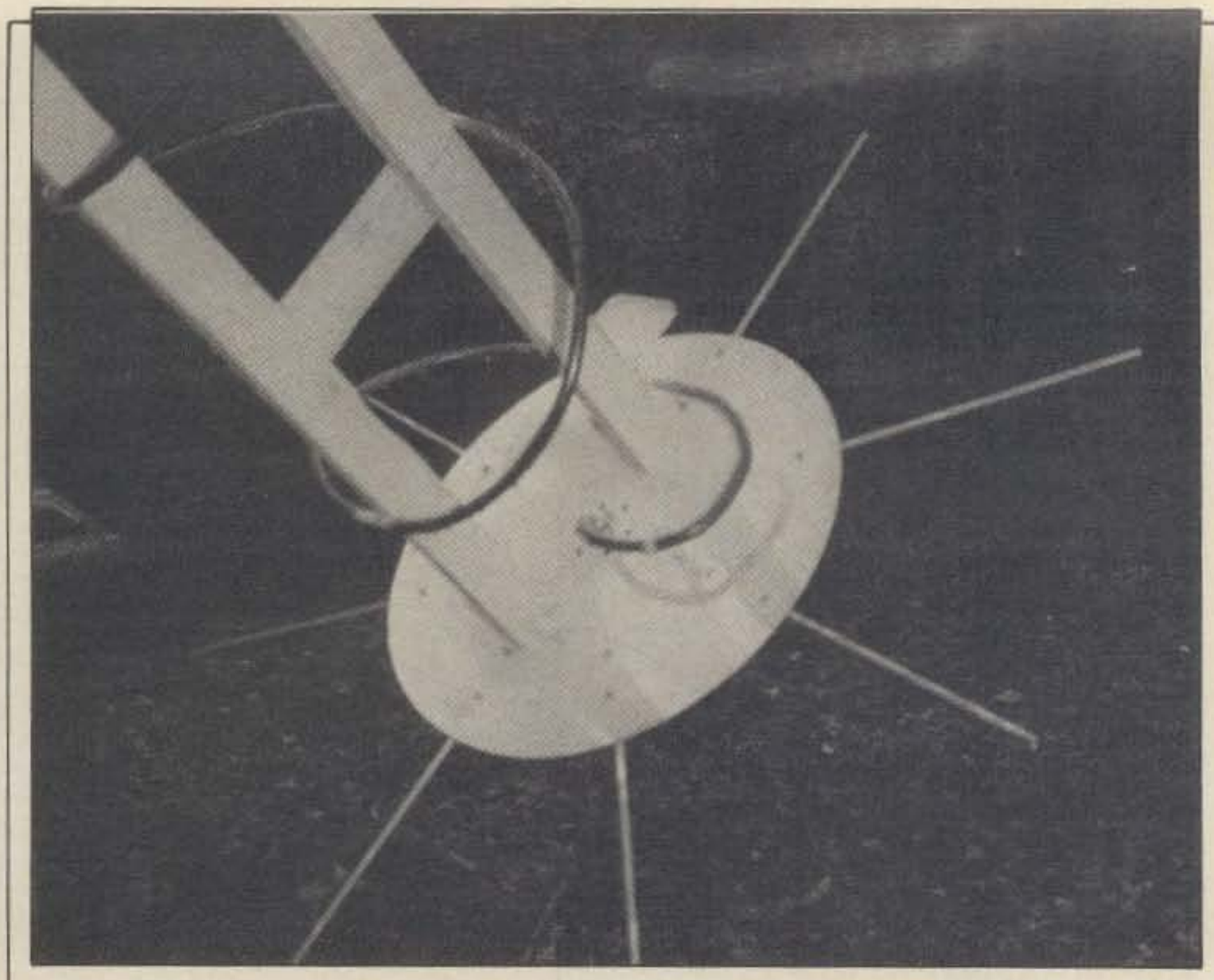


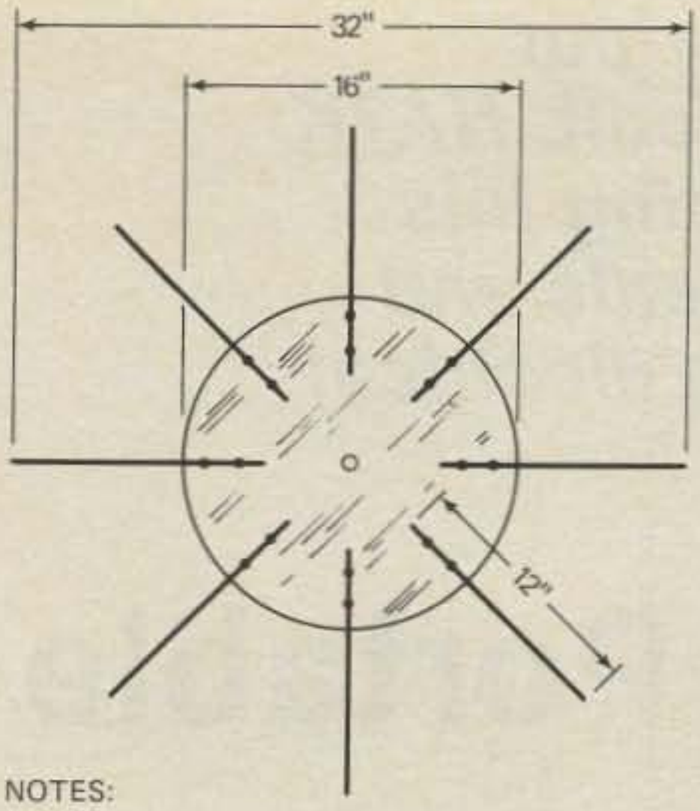
The bottom of the helix showing the radials, capacitor (upper right center of the disc), and the turns.

dance hump caused by the "u.h.f."-type connectors would probably result in maybe a dB of noise added to the system.

The near-perfect 50 ohm match was accomplished by running the first one-third turn of the winding close to the ground plane and adding an adjustable capacitor. In my case this is nothing more than the top of a popular lozenges container which is soldered to the outside braid of the coax spiral at approximately one-third turn from start. If your experience is like mine, you might have something like a 3 to 1 s.w.r. at this point and want to get a better ballpark figure by pruning the far end of the winding a few inches until it at least starts down. Alternately, try adjusting the capacitor, and you will eventually arrive at a good v.s.w.r. My helix has approximately 1.03 v.s.w.r. as measured on a Bird 43 wattmeter.

I realize that some people prefer the classic-type construction of helical antennas over all that has been described here. The classis design is wooden dowels tediously mated into a center piece in a spiral arrangement with a copper screen reflector, etc. All I can say in defense of the "Quick and Easy" is that it

The 12-turn model facing towards the sky.



NOTES:

1. Each of the 12" aluminum spokes are attached with two small machine screws. (Flatten spoke slightly to bore holes at bolt point).
2. Disc is aluminum transcription with coating removed (see text).

Fig. 3– The transcription disc radial system as described in the text.

lives up to its name in assembling and works just as well as any—maybe better. However, don't expect any 6-turn helix to equal the gain of the current commercial high-gain, crossed dipole types. To really compete with these antennas one can add 6 turns and have a 12-turn high-gain signal-shooter that will equal, and at times surpass, the crossed-dipole types. For one thing, I believe you get less QSB and/or "spin modulation" with a helix. I will discuss some of the reasons for this later on.

I will describe now the "gain extension" mentioned earlier, which consists of 6 more turns of 9913 wound on an identical wooden frame as before. It may be bolted to the original frame via four large bolts (see photograph). The result will be a nice 12-turn high-gain helix with right-hand circular polarization, sometimes abbreviated RHCP.

Before proceeding with the 6-turn extension, I decided to slow down a bit, recalling that I had put the original 6-turn together in some haste in order to try it out as soon as possible (normal ham anxiety!). I wondered if I would have any trouble just tacking on 6 more turns. Looking at helical theory some more, I found that everyone agrees that the natural terminal impedance of any helix of over, say, 3 turns is on the order of 130 to 140 ohms, and that this impedance *does not* change appreciably with the addition of more turns. I rationalized, then, that if there was a 50 ohm match obtainable to begin with, it probably would remain stable if the spiral were lengthened also. Sure enough, I later found the v.s.w.r. to be about the same 1.03 with the extra turns. Looking good!

Theorizing a bit more, I wondered just how critical the length of a single turn would be and what winding pitch I should use. It was noted that in a helical beam one complete turn usually equals one wavelength, and at any given instant the positive and negative charges appear at opposite ends of an imaginary line drawn through the diameter. All through one cycle, then, these charges will revolve, and the whole antenna pattern will be one of circular revolving polarization. If the spiral is wound to the right, as viewed from the ground-plane feedpoint out, one w ill get right-hand circular polariztion. This is what Oscar 10 likes 90% or so of the time. The bird also likes good circular polarization, and it is my belief that a helix best provides that. i know I get less QSB and spin modulation with my helix than with other types of antennas most of the time. It is true RHCP.

In view of all of the above, I decided to rewind the whole spiral, paying more attention to the length of each turn and the diameter between turns. I was careful not to stray too far from the usual one wavelength per turn and quarter-wave winding pitch. I did fudge just a little, and made both just slightly longer for what seemed to be convenience and symmetry. No harm done. A helix with these dimensions will have a rather broad bandwidth. It should be mentioned that this antenna could be useful at 432 MHz, of course, and on ATV frequencies. Also, it would be useful for downlink reception on Oscar 10 (Mode L) and other satellites (Mode J).

The final result was just what I wanted. I have named it "Felix the Helix," because 'ole Felix sometimes sneaks in a better signal than the commercial antennas I have when I compare it in an on-the-air test. The commercial antennas are AZ-EL, motor controlled on my chimney, and Felix is on the ground. I get a chuckle and a jolly-good feeling inside when Felix equals or beats the other antennas, and of course, I just ignore it when he loses out to them on rare occasions. Hi!

I did all this for fun and experience anyway, but got "all wound up" doing it, and I hope you do too! CQ

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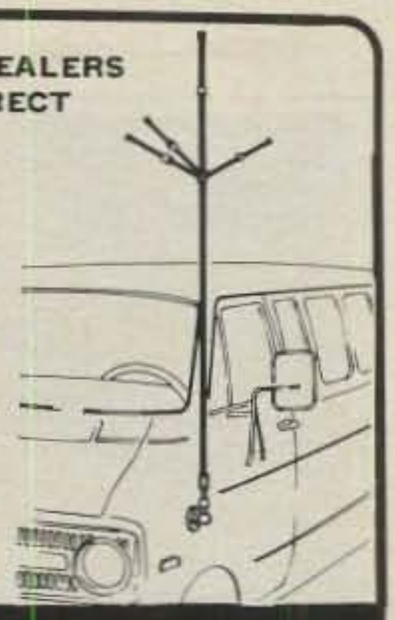

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The construction of a piece of useful amateur equipment need not be expensive or difficult. NA7K presents some useful techniques in building this accessory that will power up both handhelds and various 13 volt mobile gear from the car's electrical system.

Build a Mobile and Portable Utility Box

BY DAVID F. PLANT*, NA7K

Housed in a small plastic enclosure, the utility box is dwarfed by the equipment it powers. The holes along the side of the case are for ventilation.

It seems to me that there is nothing that can be more soul-searching to the mobile-inclined amateur than the drilling of holes for power and antennas in a brand new car. The antenna problem can solve itself by the use of bumper and trunk-lip mounts, but accessing the 12 volts from under modern and crowded dashes can be a headache.

This problem is compounded when several cars and rigs are involved. My home-built gear had one type of connector and various manufacturers had others. Some method of standardization was in order, and based on the fact that most cars have cigarette lighters, the utility box came about.

Standard ¼ inch phono jacks were used for the high amperage gear, and ⅛ inch mini types were chosen for the regulated and charging outputs for the handheld. The different sizes are a safeguard, and both are commonly available. Also for safety, the circuit is fused and contained in a nonconductive box.

An LED indicator serves as the power-on indicator, and, as it is wired in the circuit following both fuses, serves as a circuit checker. The external fuse, shown next to the power cord, is the 10 amp primary fuse. This value powers most mobile gear in the 25–35 watt range and will blow before the lighter fuse will. The second fuse is mounted internally, and its job is to protect the handheld gear in case of regulator failure.

The Circuit

Referring to fig. 1, power enters the box through F1 to parallel wired jacks J1 and J2 for major 13 volt equipment. Power also goes through R1, a current-limiting resistor, for NiCad charging, and to internally mounted fuse F2. R1 was chosen to provide approximately 40 ma to a discharged pack, tapering down to 12 ma when the pack is fully charged.

Zener Z1 provides regulated base drive for the pass transistor, Q1. This zener should be chosen for a nominal 0.6 volts higher than the desired regulated output to compensate for the transistor's base emitter drop. I used a 9 volt unit to provide 8.4 volts to an ICOM 2AT. Z2 is then also 9 volts, which is raised to 9.6 by the series diode, D1. This compensates for various zener tolerances.

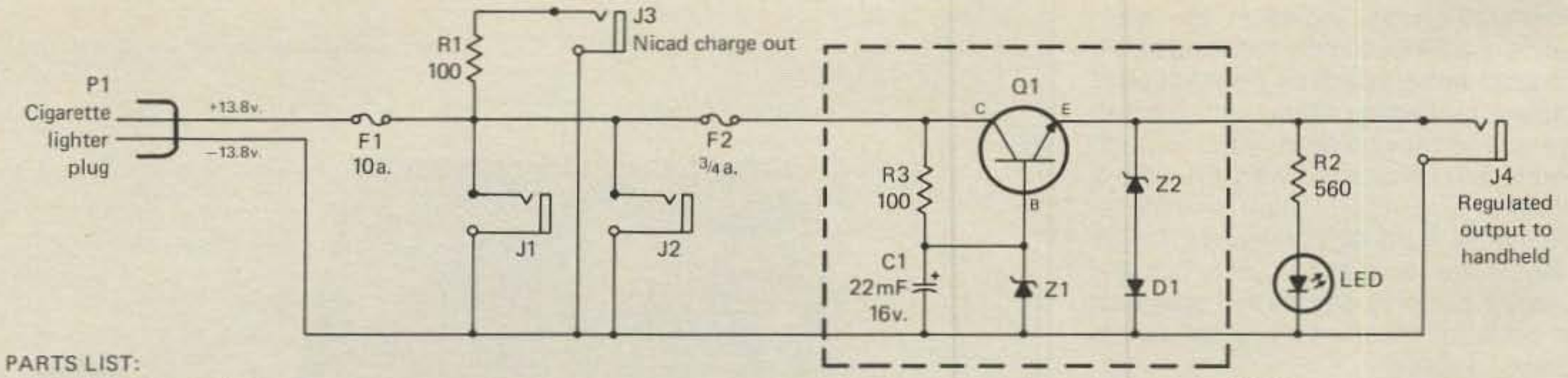
This zener/diode circuit conducts and causes F2 to open if the pass transistor, Q1, shorts, or Z1 opens up, thus protecting the handheld from overvoltage.

Construction

My model was built in a stock-size, blue, plastic box measuring 2½" × 4¾" × 1½" and is available at Radio Shack, as are the other components. These little boxes have been found to be reasonably rugged and extremely easily worked. My trick for making the various holes without cracking the case is to use a small tipped soldering iron to initiate the hole, and then enlarge to size with a reamer. This

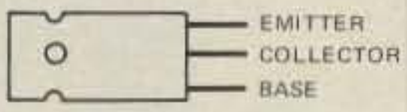
*10248 N.E. 120th, Kirkland, WA 98033

Say You Saw It In CQ



PARTS LIST:

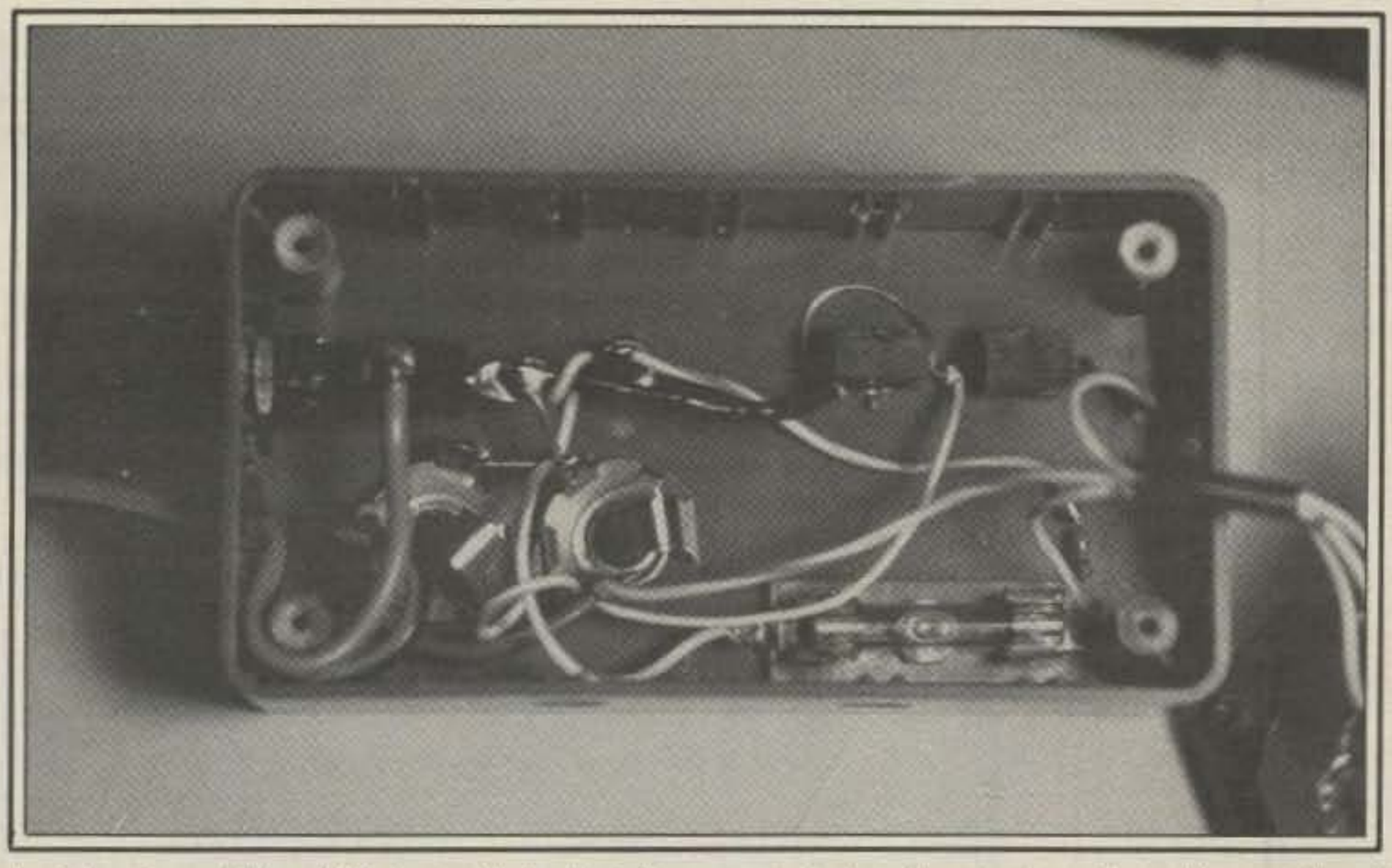
J1, J2 = ¼" phono jack.
J3, J4 = ⅛" miniature jack.
Z1, Z2 = 1w. Zener diode. Chose value that is .6v. higher than desired output.
D1 = 1N4001 or equivalent.
Q1 = Radio Shack #276-2048 (any TO-220 type NPN power type of 10w. or more).



Q1 DETAIL

NOTE:
Dotted lines indicate circuitry on regulator terminal strip.

Fig. 1– Schematic diagram for the mobile utility box.



Inside view of the utility box. Note that the power in lead is strain relieved by routing it around a mounting pillar. The high current jacks, J1 and J2, are in the lower left.

mounted by the power transistor tab to a piece of aluminum stock cut to fit within the lid. The aluminum serves to heat-sink the pass transistor and provide a means to electrically prevent Q1's collector mounting hardware (+ 13 volt) from coming in contact with anything grounded externally.

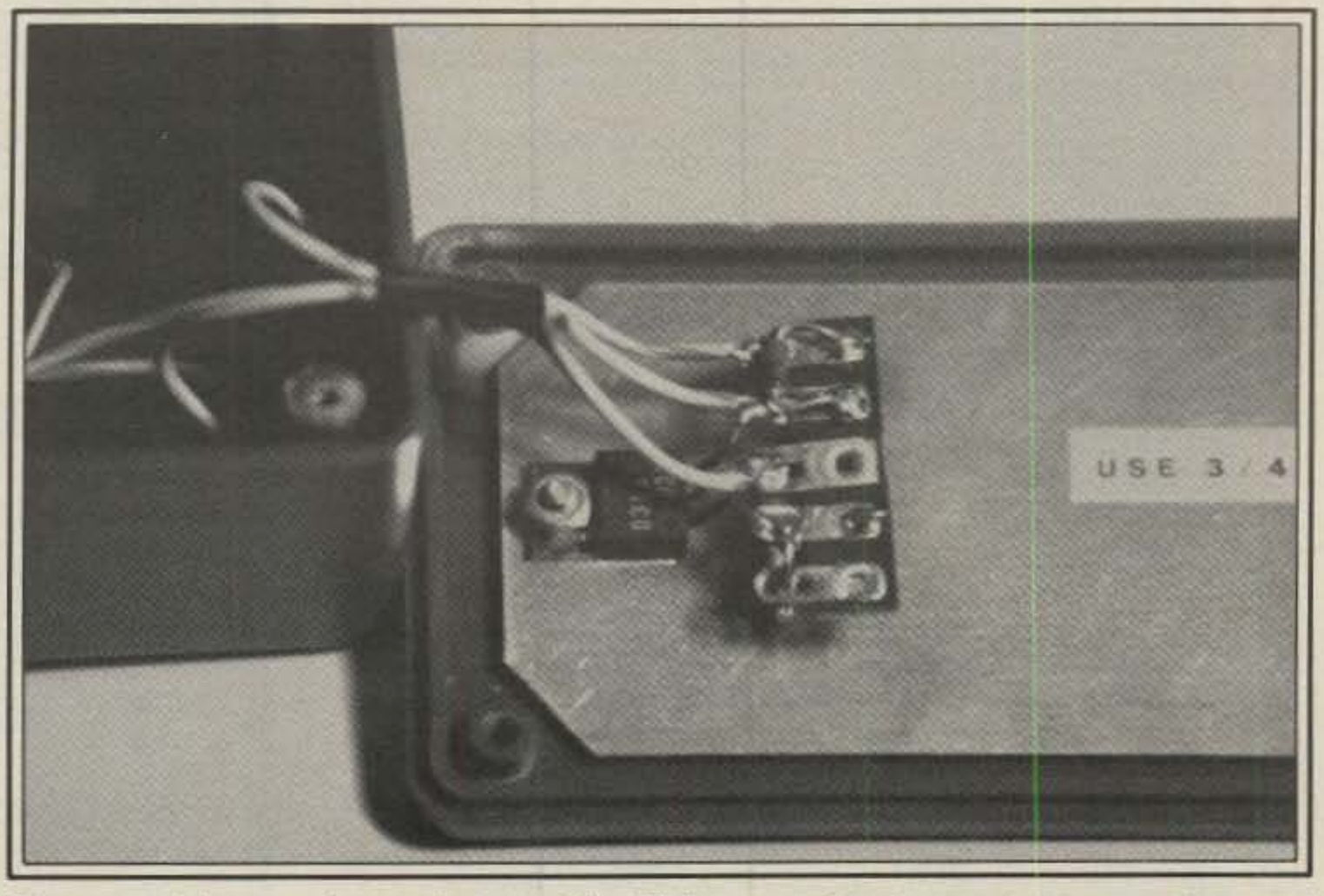
The aluminum stock is fastened to the inside top cover with double-sided, sticky tape. The holes placed around the case are for ventilation, as it was found that the regulator would get slightly warm to the touch when the supply was tested into a load simulating a 2 watt transceiver under continuous high-power transmit. This is a worst-case situation and possibly over-design.

Plastic-encased jacks are used for J3 and J4, as this type was found to have more rugged solder tabs for various connections—especially the lead going to the regulator section.

technique makes marvelously simple and quick work of obtaining proper holes. When using this technique, be sure to allow for ventilation (my wife usually finds a reason to leave the workroom during this process) and thoroughly wipe the soldering tip clean with a wet sponge and retin promptly.

As seen in the photograph, the power lead enters the case through a grommet and is strain relieved by wrapping it around an enclosure securing post. Following standard protocol, the sleeve of the jack receives the minus lead, and the positive lead goes to the 10 amp fuse jack, J1. At this point it is a good idea to confirm that the center pin of the cigarette lighter is hot 12 volts plus. Plugging the partially assembled unit into the car and measuring with a voltmeter will confirm this.

The voltage regulator assembly (indicated by dots in the schematic) is wired around a 5 lug terminal strip as shown in the closeup. This portion of the circuit is



Close-up of the regulator sub-assembly. All the associated components are mounted on the 5 lug terminal strip.

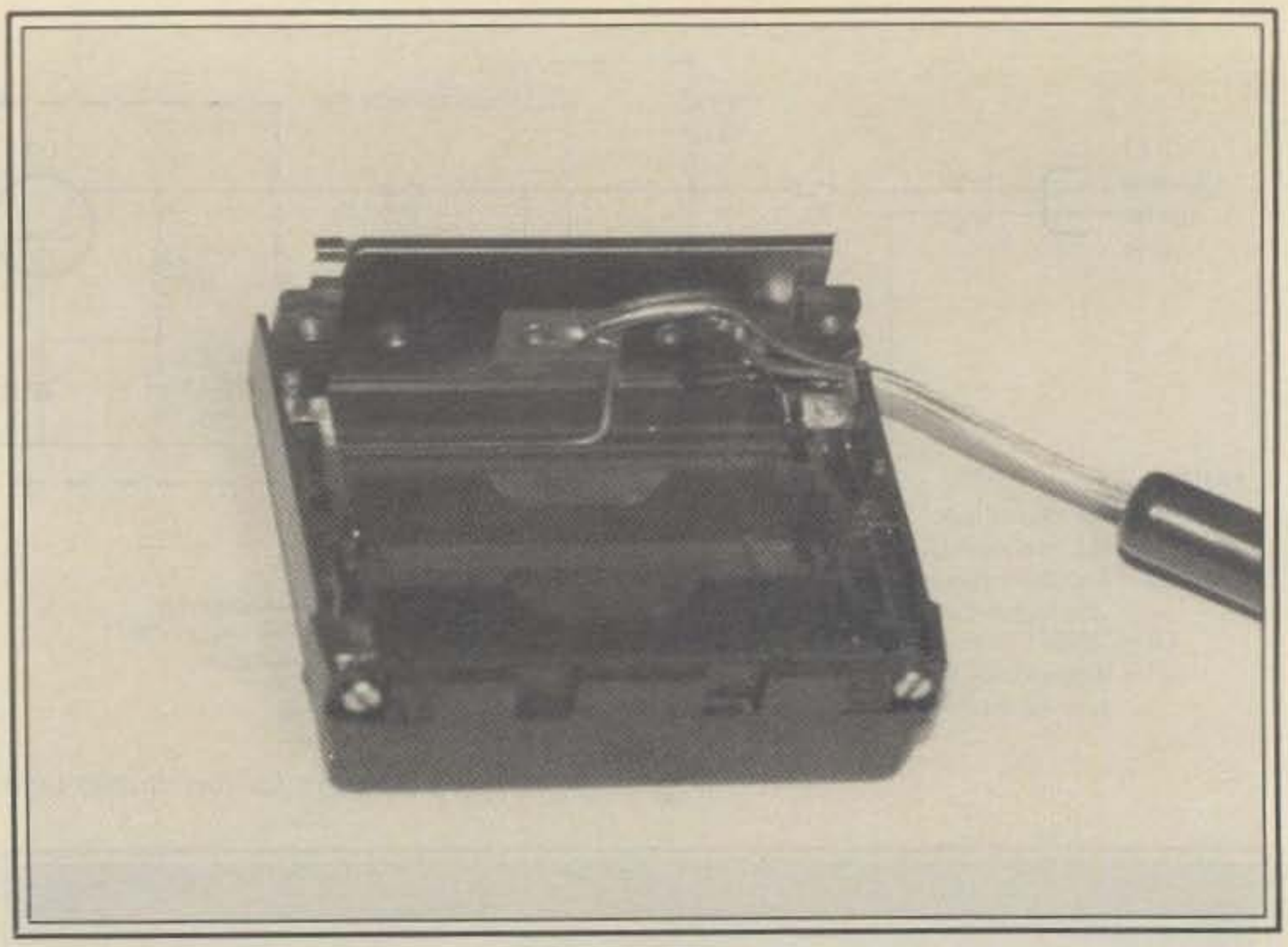
Powering Handhelds

Rather than drill holes in the main housing of a 2AT, I slightly modified a BP4 accessory battery pack by the addition of a cable attached in parallel with the battery/transceiver contacts, fitted through a notch, and terminated with a female ⅛ miniature plug. From there a male-to-male patch cord of convenient length connects the radio to the utility box, yet allows the battery pack normal operation with batteries inserted when the unit is unplugged.

Another approach is to install the regulator circuit directly in the BP4 pack if one wants to use the pack in such a dedicated manner.

A third approach is to keep the NiCad on constant charge while the transceiver is in use. The 20 or so milliamps charging current covers the squelched receiver requirement, but the battery will slowly lose voltage when in active use, not unlike a full water bucket leaking two drops of water for every one being put in. This method does, however, allow for a full day's activity.

Total drain for the utility box is typically 40 ma with no load. This current is used to light the LED and provide drive for the regulator zener. Although quite small, this current can slowly discharge the automotive battery after a period of time, and unplugging the unit when the car is inactive is recommended. My unit has no primary switch, as it is kept under the passenger seat, but adding a switch between the incoming positive lead and F1 would be a simple matter. I simply unplug the unit when leaving the car at the airport or for a long weekend.



This photo shows the modification to the Icom BP4 battery pack. This pack can still be used for normal battery operation.

Incidently, a variation of the utility box with an a.c.-regulated 13 volt supply using a VPS 912 (*CQ*, November 1981) is used for fixed station operation. The 912 drives a heat-sinked 2N3055 power pass transistor.

The utility box has found daily use at NA7K in the various family cars. The handheld is operated barefoot to access local repeaters, it drives a power amplifier for simplex work, and the s.s.b. rig adds some fun to mountain-topping. CQ

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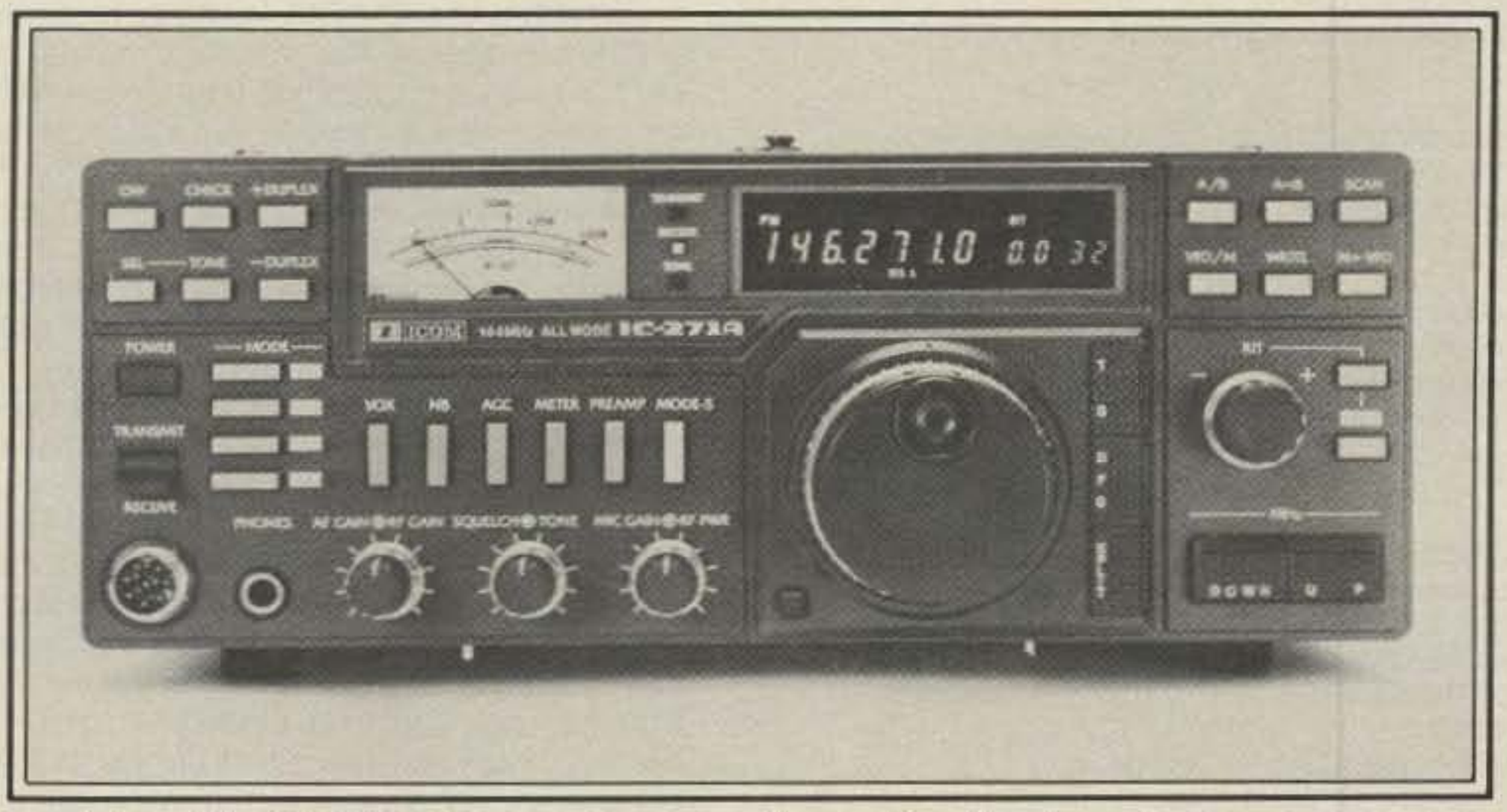
CQ REVIEWS: BY DAVE INGRAM*, K4TWJ

The ICOM IC-271A Two Meter Transceiver



Front view of the ICOM IC-271A reveals an attractive and functional layout with numerous "bells and whistles" for the discriminating operator.

The IC-271A is a very attractive unit of relatively small size (11"H × 11"W × 5"D). The rig is dark gray with a traditional ICOM layout consisting of numerous push switches, an adjustable drag tuning knob, digital readout, dual v.f.o.'s, plus not 2 or 4, but 32 full function memories. Its internal speaker is mounted inside the bottom cover, and a tilt-up bail angles the rig for easy viewing. The rig runs 25 watts output on any mode, and a 12 volt power source capable of 13.8 volts at 6 amperes is required. Suitable a.c. supplies include ICOM's PS-15 or the optional IC-PS25 internal supply (which, incidentally, doesn't exclude powering the unit from an auto battery for mobile use).

One of the typical first queries on the IC-271A relates to applications for 32 memories. Although your area may support only six or seven f.m. repeaters, bear in mind that OSCAR satellites have opened new horizons on this band. Once you become involved in the exciting era of Phase III and OSCAR 10, you'll find a *need* rather than a *use* for all 32 memories. In addition to storing several beacon and service channel frequencies, you can also store "reference" downlink frequencies. This reduces the guesswork, of satellite activity; simply call up the known frequencies, check for "through bird signals," and join the action. Considering the tremendous capabilities of satellite communications, we're quite confident that 2 meter and 70 cm all-mode transceivers are the rigs of the future.

*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

Features and Frills

Considering this unit is loaded with bells and whistles, let's begin our discussion with the basic specs of fig. 1 and proceed from there. Frequency coverage is 143.800 to 148.1999 MHz, with a continuously adjustable output from 1 to 25 watts. Receiver sensitivity is very good, but I definitely recommend the *optional* r.f. preamp for OSCAR work (once installed, the front-panel switch can be used for activating this preamp).

Looking at the 271A's front panel, there are three switches mounted vertically beside the rig's main tuning knob. The **TS** switch changes tuning speeds, the **DFS** selects dial functions of frequency or memory selection from the main tuning knob, and the **Split** switch permits transmitting from one v.f.o. and listening on the other. There are six push switches on the front panel's upper area. The **+Duplex** and **−Duplex** switches select 600 kHz offsets. When the **OW** switch is also pushed, the dial reads −600 or +600 as selected. Any offset can be selected at that time merely by rotating the main tuning knob. When the **Tone** switch is pushed, a subaudible (CTCSS) tone is superimposed on the transmitted signal. If the **SEL** button is also pushed, subaudible tone frequencies between 67 and 141.3 Hz or burst between 900 and 2125 Hz can be selected by the main tuning knob. The resultant frequencies (receive and transmit) mode and tone can then be stored in memory.

The IC-271A will scan the full 2 meter band, any preprogrammed portion of the band, its 32 memories, or only memories relating to a selected mode (c.w., s.s.b., f.m., etc.).

During normal operation the rig tunes s.s.b. in 100 Hz steps and f.m. in 5 kHz steps. The front-panel **TS** switch changes this to 1 kHz steps in either mode. Dual v.f.o.'s, memory-to-v.f.o. and v.f.o.-to-memory switches plus variable transmitter offsets, 1 MHz up/down switches, an optional tone encoder *and* decoder unit, plus an internal mike preamp (which permits use of one's favorite mike) round out the IC-271A's special features. A slightly closer investigation reveals interchangeable use of ICOM '730/'740-type mike and power interconnections (ICOM preamplified mikes can be used by lowering the mike's input control). A blue-white frequency display with RIT in red and a "stopless" RIT tuning control are featured. VOX is included, along with semi-breakin for c.w. A speech processor is not included. However, their use isn't recommended for OSCAR operations. A microphone is not included with the IC-271A.

A Glimpse Inside

Although the IC-271A is a unit of sophisticated design and its supplied manual doesn't explain circuitry, it's quite interesting to look inside at the "layered design" and visualize the rig's operational concept. This is especially useful when the purchase of two different rigs is being considered.

The IC-271A's block diagram is shown in fig. 2. Note the margin's legend of square blocks for receive path and arrows for transmit path. Draw a line through the diagram's middle, starting below the mike; continuing under IC1, Q1, IC2; following the dotted line around **RF POW**, under Q5, and out the right side. Next, separate the bottom half into three sections using the dotted lines (and that long string of arrows) as a guide. Label the left bottom **FM/CW/SSB Support**, the middle bottom **Control Logic**, and the right bottom **PLL and Oscillator**. These sections provide support for the r.f. stages in the upper diagram's layout.

Now let's consider the actual "meat" of this unit's circuitry (the block diagram's top section). Using different colored pens for receive and transmit paths, we will begin with the receiver. Incoming signals enter from the antenna, and go through a lowpass and bandpass filter to Q7, a 3SK48 FET. Next, it's mixed to 10.75 MHz, passed through a 15 kHz filter, and passed to i.f. amplifier Q12 (at which point the f.m. signal is routed to IC14 and then to Q30). Meanwhile, s.s.b./c.w. signals proceed through the noise gate, to the 2.4 kHz s.s.b. filter, through i.f.'s Q19 and Q18, through the

SPECIFICATIONS: IC-271A

GENERAL	
Frequency coverage	: 143.8000 — 148.1999MHz
Frequency resolution	: SSB, 100Hz steps FM 5KHz steps
	: 1KHz steps with TS button depressed
Frequency readout	: 7 digit flourescent display 100Hz readout w/RIT
Frequency stability	: ±10 PPM (-10° — +60°C)
Memory channels	: 32 channels, any inband frequency programmable
Usable conditions	: Temperature: -10°C — 60°C (14°F -140°F) Duty cycle: Continuous
Antenna impedance	: 50 ohms unbalanced
Power supply requirement	: 13.8V DC ±15% (negative ground) 6A max. or 117V/AC ±10%
Current drain (at 13.8V DC)	: Transmitting
	: SSB (PEP 25W) Approx. 6A
	: CW, FM (25W) Approx. 6A
	: FM (1W) Approx. 1.0A
	: Receiving
	: At max. audio output Approx. 0.6A
	: Squelched Approx. 0.4A
Dimensions	: 111mm(H) x 286mm(W) x 274mm(D)
TRANSMITTER	
Output power	: SSB 25W (PEP), CW 25W, FM 1 — 25W (Adjustable)
Emission mode	: SSB (A3J, USB/LSB), CW (A1), FM (F3)
Modulation system	: SSB: Balanced modulation
	: FM: Variable reactance frequency modulation
Max. frequency deviation	: ±5KHz
Spurious emission	: More than 60dB below peak power output
Carrier suppression	: More than 40dB below peak power output
Unwanted sideband	: More than 40dB down at 1000Hz AF input
Microphone	: 600 Ohm (IC-SM5 optional base mic available)
Operating mode	: Simplex, Duplex (any inband frequency separation programmable)
RECEIVER	
Receiving mode	: SSB: (A3J, USB/LSB), CW (A1), FM (F3)
Sensitivity	: SSB, CW: Less than 0.5 microvolts for 10dB S+N/N
	FM: More than 30dB S+N+D/N+D at 1 microvolt
Squelch sensitivity	: SSB, CW: Less than 0.6 microvolts
	FM: Less than 0.4 microvolts
Spurious response rejection ratio	: More than 60dB
Selectivity	: SSB, CW: More than ±1.2KHz at -6dB point
	Less than ±2.4KHz at -60dB point
	: FM: More than ±7.5KHz at -6dB point
	Less than ±15KHz at -60dB point
Audio ouput power	: 2 watts
Audio ouput impedance	: 8 ohms
RIT variable range	: ±9.9KHz

Fig. 1– Manufacturer's specifications for the ICOM IC-271A.

b.f.o. mixer/product detector (IC3), and on to Q30. Did you notice the noise blanker was *after* the f.m. takeoff? Obviously, it is only useful for s.s.b. or c.w. operation. Notice, however, an f.m. noise filter is included in IC14. Returning to Q30, follow audio through IC13 and IC12 to the speaker.

Following the s.s.b. transmit path from the mike, signals pass through IC1 a and b, a buffer to b.f.o. mixer IC3 (which, according to normal s.s.b. theory, must now be functioning as a balance modulator). Proceeding "upward," it goes through Q10, FL-1 (drop one sideband), and to Q4. Continue following arrows through mixer Q2, Q3, Q4, the 25 watt r.f. module, and to the antenna. Returning to IC1b, follow the f.m. transmit path through Q1, the varicap/crystal modulator, limiter amp IC2, and into the previously discussed Q4. At this point, you can now backtrack and fill in some of the remaining blocks such as VOX, S meter, center meter, etc. If you're interested in oscillator signal generations, notice crystal oscillators in the PLL section drive a programmable divider. This M54929P is controlled by the logic section's CPU. Notice also how the tuning knob and up/down buttons program the CPU. Now take a few minutes time to review the unit's overall concept and maybe compare it with your existing rig. Interesting, eh?

On the Air

Operating the IC-271A is sheer pleasure, particularly after all lithium battery maintained memories are programmed for activity. While the unit can be used mobile on a second's notice, I personally think it's primarily a rig for the home setup. Maybe that's because the tuning knob isn't detented for channelized f.m. work, or maybe it's because I visualize OSCAR and s.s.b. as fixed-station activities with f.m. operations being secondary.

As previously mentioned, I use the memories for storing both f.m. and OSCAR frequencies. During the afternoon, the rig is lightly used on f.m. Later, an OSCAR memory is recalled and the **M to VFO** button punched. When an interesting QSO is spotted, the **VFO to M** button is pushed and band tuning continues. Within a few minutes QSOs are being recalled from memory, and some of the fast "multi-operating" such as I described in August 1983 *CQ*'s World of Ideas column is conducted. Those techniques, which can be directly applied to the IC-271A, are too lengthy to be repeated here. This ability to band scan, jump around, and truly *use* a rig's bells and whistles can't be beat.

Initially programming the rig for one's interest and local activities (including strange offsets, tones, etc.) takes a few minutes. This is when the **TS**, **DFS**, and **MHz up/down** buttons are most used. Fortunately, the memory battery has a lifespan of several years.

The receiver (which is double conversion on f.m. and single conversion on s.s.b. or c.w.) performs admirably, and the transmitter's 25 watts output is quite acceptable (power can be front-panel reduced to 10 watts or less, if desired).

After a couple of afternoons of QSOing the XYL (WB4OEE) on the IC-271 with an ICOM SM5 desk mike, we substituted my 730's preamplified mike containing a Heil HC-3 element. The difference was fantastic. The transmitted signal acquired a beautiful clarity and audio "sparkle" that set is apart from other signals. Try that combination for yourself if you appreciate superb audio.

Conclusion

The ICOM IC-271A is especially suited for the fixed station and occasional mobiler. The rig is progressive oriented in capabilities, and some exciting options can be added for more enjoyment. These options include the tone decoder unit (great for quiet monitoring of busy repeaters), the internal PS-25 a.c. supply, the r.f. preamp unit, and a voice synthesizer. There's room inside the cabinet with interconnecting plugs awaiting installation of options. For more information, contact ICOM America, 2112 116th Avenue N.E., Bellevue, WA 98004.

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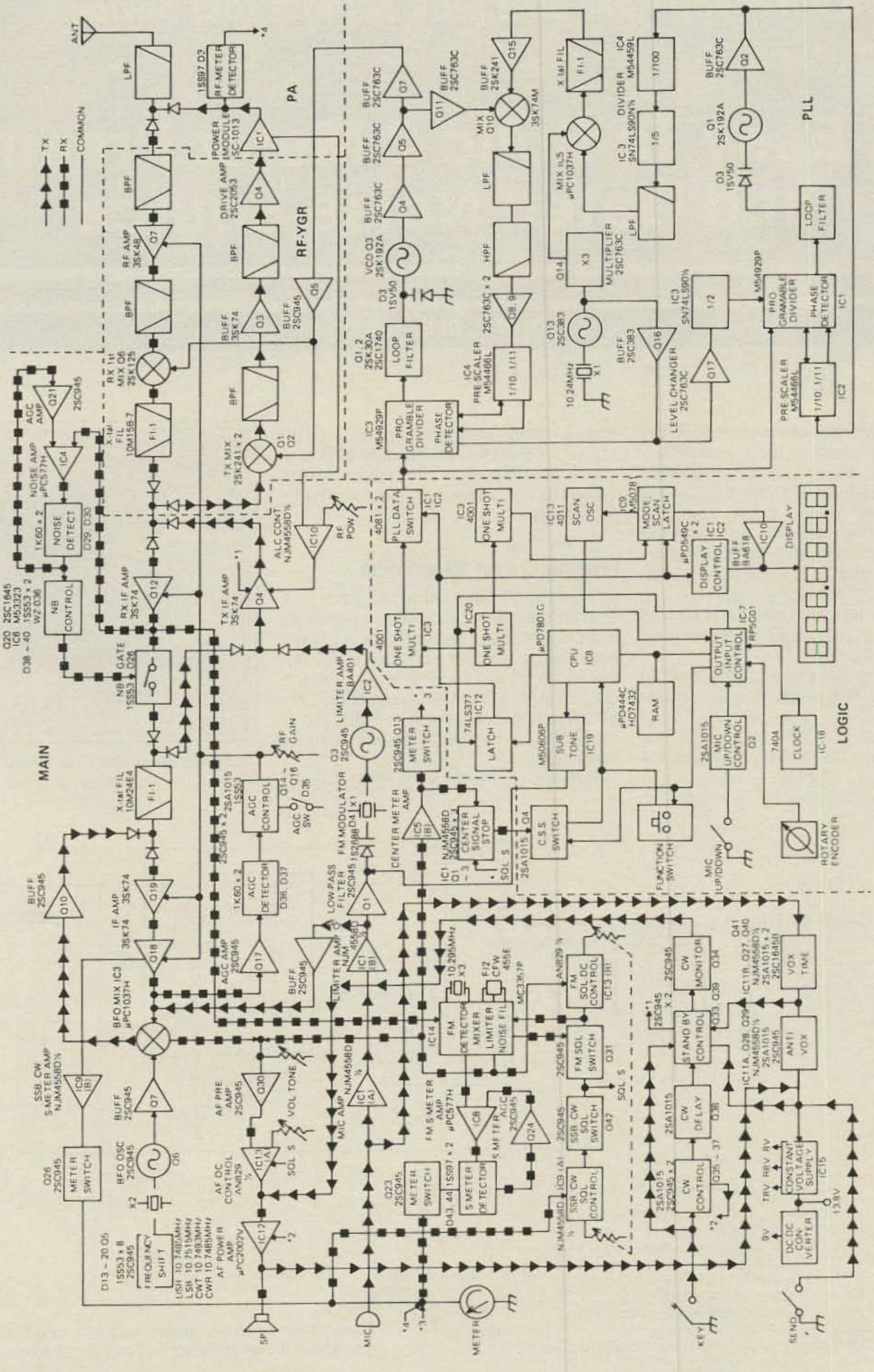
Fig. 2– Full block diagram of the ICOM IC-271A. Note legend in the upper right-hand corner. A detailed discussion is presented in the text.



Here's a simple add-on feature that will go a long way to improve what you hear on 2 plus being a test device.

An Easy To Build 2 Meter Preamp and Gated Noise Source

BY JOHN C. REED*, W6IOJ

This preamp project resulted from my desire to participate in the Phase III Satellite activity. My sick 2 meter receiver failed to receive signals from the satellite and obviously needed a low-noise preamp having moderate gain. Following the preamp installation, the satellite activity sounded like that of a low-frequency DX band—many of the signals from Europe. The amplifier with a 30 dB gain is easy to build, and all parts can be purchased from Radio Shack.

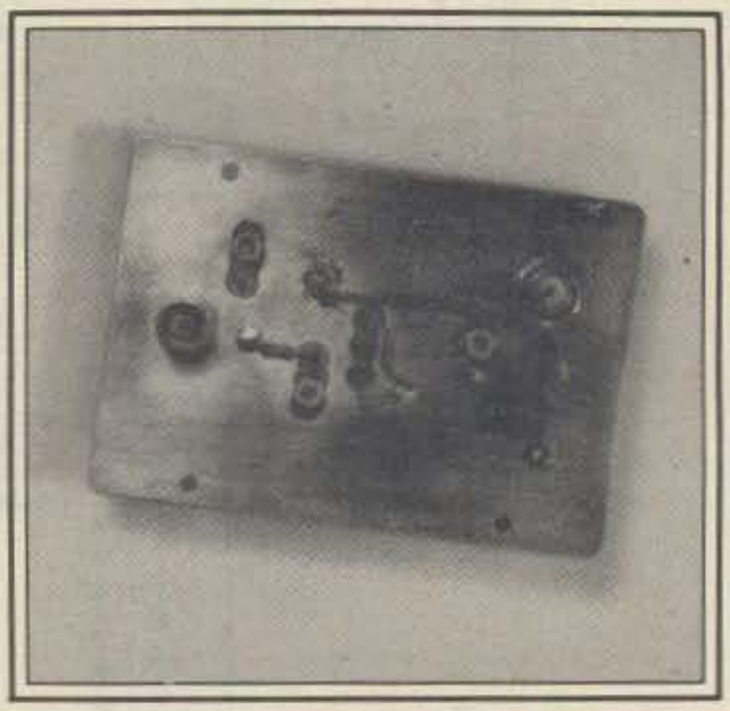
The description also includes a gated noise source. This simple test device having a variable noise output of up to 15 dB above receiver threshold noise level is invaluable when used to optimize the receiver S/N. It essentially is a poor man's laboratory signal generator.

*770 La Buena Tierra, Santa Barbara, CA 93111

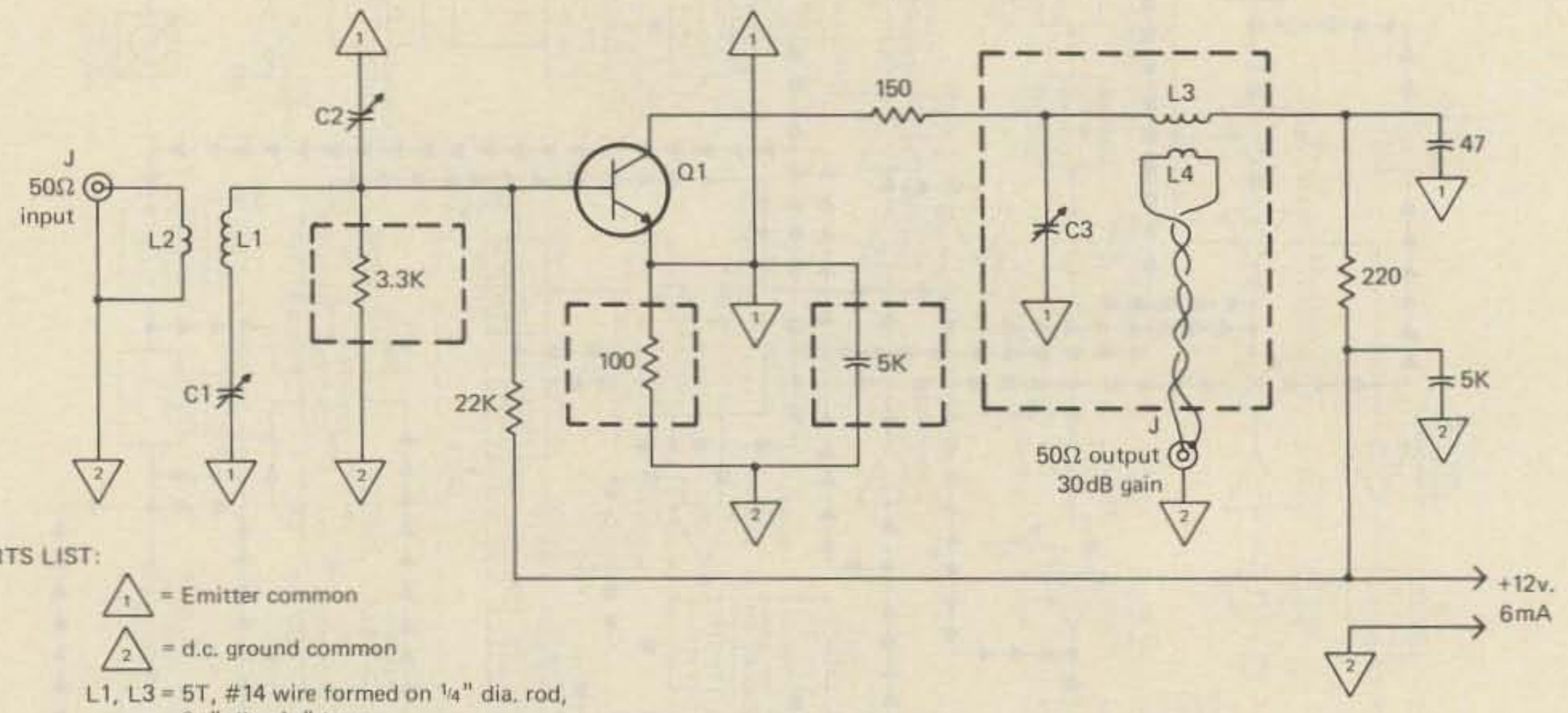
Preamp Circuit Description

The MRF901 was chosen as the active element primarily because of availability and cost. It is not a bad compromise when considering that the indicated noise figure of 1.5 dB at 150 MHz is only about 1 dB greater than the best GaAs units. Other than being inexpensive, the MRF901 is rugged and it has excellent gain characteristics.

Referring to the circuit diagram (fig. 1),



The preamp as seen from the d.c. ground common side.



PARTS LIST:

△1 = Emitter common

△2 = d.c. ground common

L1, L3 = 5T, #14 wire formed on ¼" dia. rod, ⅜" dia., ½" long.

L2, L4 = 2T, #22 stranded hookup wire formed on L1/L3 end.

Q1 = MRF901 (276-2044)

C1, C2, C3 = 5-60pF (272-1340)

J = BNC chassis connectors (278-105)

All fixed capacitors = pF/50v. disc ceramic.

All resistors = ¼w., 5% (Radio Shack catalog numbers)

Fig. 1– The 2 meter preamp circuit diagram. See text for explanation of components within broken lines.

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PARTS LIST:

L5 = 5T, #14 wire formed on ¼" dia. rod. ⅜" dia. x ½" long.
L6 = 2T, #22 stranded hookup wire formed on L5 end.
Q2 = MPS222A (276-2009)
C4 = 5-60pF (272-1340)
All fixed capacitors = pF/50v. disc ceramic.
All fixed resistors = ¼w., 5% (Radio Shack catalog numbers)
Noise level potentiometer = 5K with switch. (271-1714 + 271-1740)

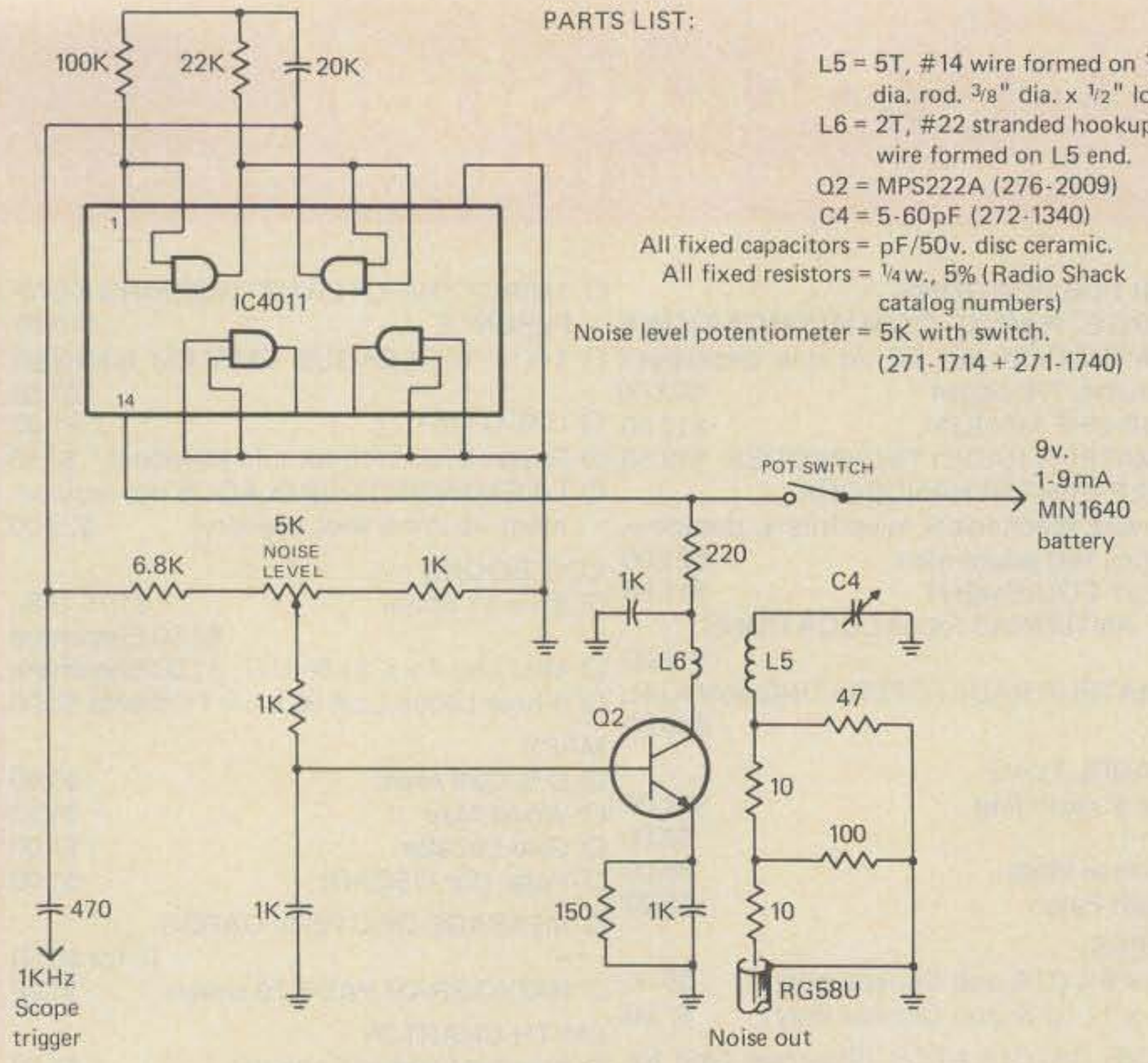
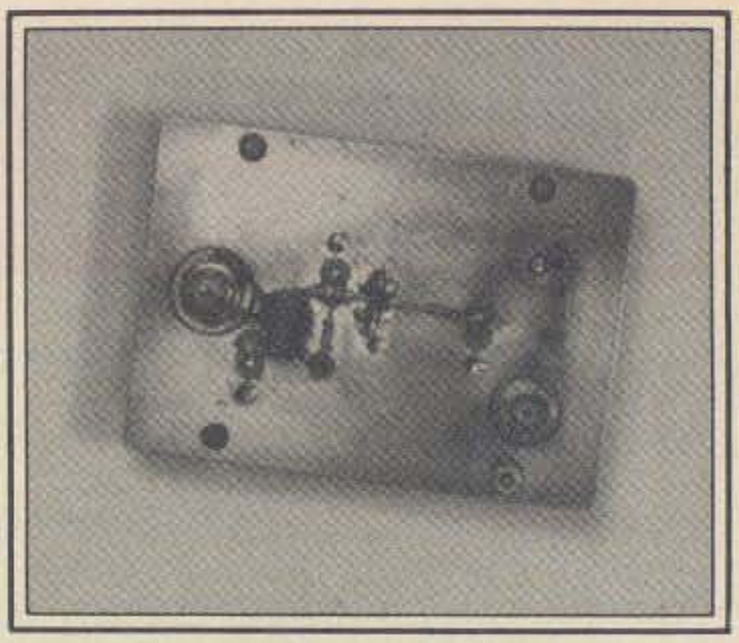
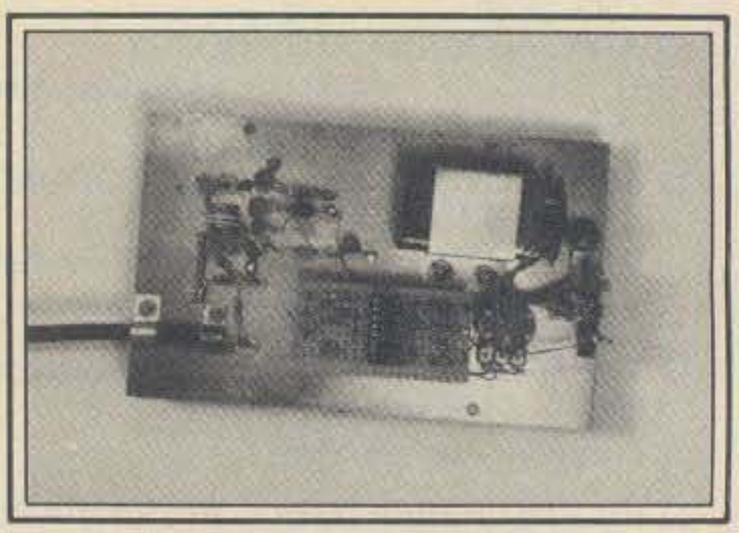


Fig. 2– Schematic for the gated noise source.



The preamp as seen from the emitter common side.



The gated noise source.

you will note there are two commons: one is the emitter common and the other is the d.c. ground common. The two are accommodated in the assembly by using a double-sided PC board; the foil on each side is used as a different common. This method minimizes stray inductance between the emitter and related input/output circuitry while avoiding the use of low-inductance-type feed-through capacitors. The input circuit is simple pi-network, the 5–60 pF C1-C2 capacitors providing the desired adjustment capability for antenna matching. When optimized, C1 is near minimum and C2 is near maximum capacity. Inductive coupling is used to d.c. isolate the antenna from the emitter common.

The MRF901, primarily a microwave device, requires special stability considerations when it is used at lower frequencies. This characteristic is accommodated in the circuit by using a degenerative resistor between the collector and the output circuit, with the resistor soldered directly to the transistor collector tab for minimizing stray capacitance. The parallel tuned output circuit is conventional except for the 47 pF by-pass capacitor. This minimal-value capacitor provides additional degeneration at lower frequencies. Using these precautions, the amplifier is stable under all operating conditions even without the use of external shielding.

Preamp Fabrication

Parts are mounted on a 4″ × 2¾″ circuit board, the layout approximately as indicated in the fig. 1 circuit diagram. All parts are mounted on the common emitter side of the board except for those indicated in fig. 1 by dotted lines. These are primarily the output circuit components and are mounted on the common ground side. The layout maximizes input/output circuit isolation. Parts are mounted using push-in terminals, removing ¼ inch diameter foil around the terminal for insulation (in some cases the terminal is soldered directly to the foil). The mount for the MRF901 is made by bending over the push-in terminal wire connecting end to form a flat mounting tab for the base and two emitter connections. The collector is soldered directly to the 150 ohm series resistor. The BNC chassis-type input/output connectors are insulated from the common emitter foil by removing ¾ inch diameter foil.

Gated Noise Source Description

This gated noise source is essentially a noisy r.f. amplifier having no input tuned circuit. Referring to fig. 2, the MPS222A noise source is link-coupled to a 150 MHz tuned circuit. The tuned circuit load resistor is followed by a 4 dB pad to assure a 50 ohm source impedance. The MPS222A is base-gated using a pair of NAND gates in a QUAD NAND Gate 4011 CMOS integrated circuit. The CMOS device was chosen to minimize power drain by the gating function. Although CMOS devices are subject to static discharge damage, the 4011 is diode-protected to minimize this problem. The square-wave generator is a conventional NAND gate oscillator, with components selected to make a 1 kHz square wave. The assembly is powered by a self-contained MN1604 9 volt battery.

Gated Noise Source Fabrication

The assembly is on a 5½″ × 3½″ single-sided PC board. The noise source components are mounted on the PC board with push-in terminals as in the preamplifier, and the NAND-gate oscillator components are mounted on a small perfboard assembly supported above the PC board by standoffs.

Operation

Gated noise source develops incoherent noise, and therefore will not function properly when used with f.m. or s.s.b. detectors that depend upon coherent information. The receiver must be in the a.m. mode of operation. When the receiver is in the a.m. mode, the gated noise will be apparent as 1 kHz audio that can be evaluated by ear, 1 kHz filter/peak-diode detector, or oscilloscope. I personally like to look at wide-band noise, and I built a special i.f. amplifier/detector to serve this function.

Aligning the preamplifer is simply noise peaking beginning with C3, then C1, and then peaking the noise gate frequency C4. The gated noise should be apparent at this stage. Optimizing the NF is accomplished by varying the ratios of C1 and C2 for maximum gated noise. CQ

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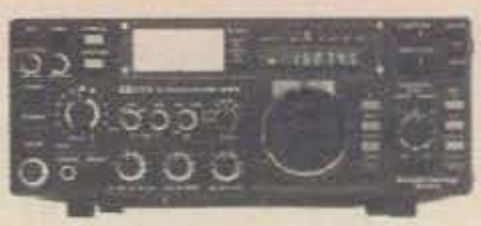

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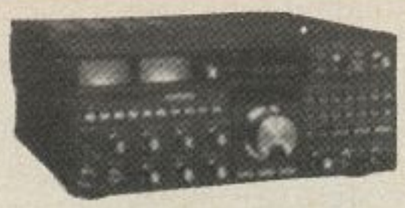

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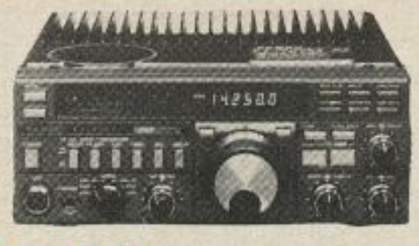

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with General Coverage RCVR includes CW keyer, AM/FM, CW filter

List Price $829

CALL FOR SPECIAL PRICE

FT-ONE

With Four Free Filters

List Price $3074

Limited Quantity For

$1995.00 SAVE $1079

FT726R

(Optional modules for 6m, 430, 440 MHz) Great for Satellite Work

List $899.00

CALL FOR SPECIAL PRICE

FRG-7700 Receiver

List Price $499

CALL FOR SPECIAL PRICE

FT-77

Perfect Mobile Rig

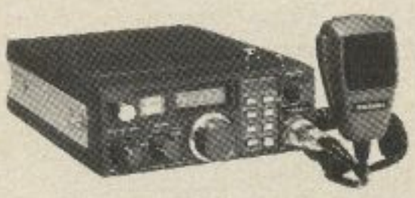
List $599

CALL FOR SPECIAL PRICE

FT-230R 2mtr FM . . . . . List $359
FT-730R 440 MHz FM . . . . List $399

- 10 Memories
- Two VFO's
- LCD Readout
- 25W Out
- Memory of Up/Down Scan

Call today for Special Discount Price & Save $$



VHF/UHF Multimode Portables

FT-690R 50MHz . . . . . List $379
FT-290R 144MHz . . . . . List $399
FT-790R 430MHz . . . . . List $399

Call today for Special Discount Price & Save $$

FT208R 2m HT
FT708R 70cm HT

FT208R List $319
FT708R List $319

CALL FOR SPECIAL PRICES

Accessories Available:
LCC-8 Leather Case . . . $35
YM24A Spkr/Mic $39
FNB-2 Nicad $29
NC-8 Base Chgr $99

FT203R

New 2 mtr HT w/VOX
Special Promo
w/Free VH-2
Headset
$239 Value

$219.00 SAVE $20.00

TEN-TEC SALE!

CORSAIR List $1169
Deluxe AC Supply List $199
Both Items—Yours for $1169!

TEN-TEC
New 2M HT
Full Featured!
List $319
Sale $279.95!

4229 2KW Tuner Kit $189.95!

AZDEN PCS 4000

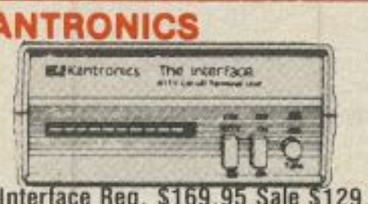
CALL FOR SPECIAL PRICE

CP-1 COMPUTER PATCH
List $239.95 SALE $189.95!

CP1-20	$219	CP1-64	$219
MP-20	$119	MP-64	$119
VIC-20 MBAText	$79	C-64 MBAText	$79

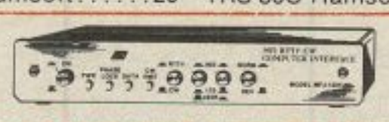
All AEA Keyers, Antennas & Accessories In Stock!

KANTRONICS



The Interface Reg. $169.95 Sale $129.95
The Interface II Reg. $269.95 Sale $239.95

Apple Amtor Soft/Hamtext	$139	VIC-20 Hamsoft	49
Vic-20 Amtor Soft	89	Hamtext VIC-20	99
Model 64 Amtor Soft	89	Hamtext Model-64	99
Apple Hamsoft	29	Atari Hamsoft	49
		TRS-80C Hamsoft	59



MFJ 1224 COMPUTER INTERFACE $89.95

202B Noise Bridge	$59.95
250 2KW Oil Load	$35.95
422 Keyer/Paddle	$89.95
901 300W Tuner	$59.95
941C 300 W Tuner	$89.95
989 Deluxe 2KW	$299.95

MIRAGE AMPLIFIER SALE!

B1016
$249

Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
A1015	6M	Yes	10W	150W	20A	$249
B23	2M	No	2W	30W	5A	$ 79
B215	2M	Yes	2W	150W	22A	$259
B108	2M	Yes	10W	80W	10A	$159
B1016	2M	Yes	10W	160W	20A	$249
B3016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	20W	5A	$ 79
C106	220	Yes	10W	60W	10A	$179
C1012	220	Yes	10W	120W	20A	$259
D24	440	No	2W	40W	8A	$179
D1010N	440	No	10W	100W	20A	$289

RC-1 Remote Control for Mirage Amplifiers $24
MP-1 and MP-2 Peak-Reading Wattmeter $99

SANTEC

NEW ST142μP 2M HT

$289

SANTEC Accessories

SM3 Speaker Mic	$34.95
ST-LC Leather Case	$34.95
ST-500 NiCad Battery	$29.95

KDK FM2033
List $339 Sale $299

TOKYO HY-POWER AMPLIFIERS

HL30V 2m Amp 2-30 FM	59.95
HL32V 2m all-mode Amp 2-30	75.00
HL82V 2m Amp & Preamp 10-80	139.95
HL160V 2m Amp & Preamp 2/10-160	288.95
HL20U 440-450 MHz Amp 2-20	98.95
HL90U 430-440 MHz Amp 10-90	319.00

TOKYO HY-POWER TUNERS

HC200 300-watt, Meter & Switch	86.95
HC2000 2000-watt, Meters & Switch	289.95

WELZ

TP5X Handheld Watt Meter	18.95
SP10X 1.8-150 MHz Watt Meter	32.95
SP250 1.6-60 MHz Watt Meter	65.00
SP600 1.6-500 MHz Watt Meter	139.95

HAL SALE!

NEW RTTY/CW COMPUTER INTERFACES

CRI-100 List $249 SALE $229.95!
CRI-200 List $299 SALE $269.95!

CWR6850 RTTY/CW TERMINAL

List $999 SALE $749.95!

Other HAL Products On Sale

CWR6700	$439.95	DS3100ASR	$1699.95
CWR6750	$629.95	MPT3100	$2199.95
CT2100/KB2100	$749.95	RS2100	$289.95
CT2200/KB2100	$949.95	ST5000	$219.95
DSK3100	$1049.95	ST6000	$649.95
ARQ1000	$649.95	KG-12	$169.95

ASTRON POWER SUPPLIES

Heavy Duty · High Quality · Rugged · Reliable

- Input Voltage: 105–125 VAC Output: 13.8 VDC ± .05V
- Fully Electronically Regulated—5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series With Meter—A-Series Without Meter

Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

MODEL RS-50A

TEXAS TOWERS

Telephone (214) 422-7306

Store Hours: Mon-Fri: 9am - 5pm
Sat: 9am - 1pm

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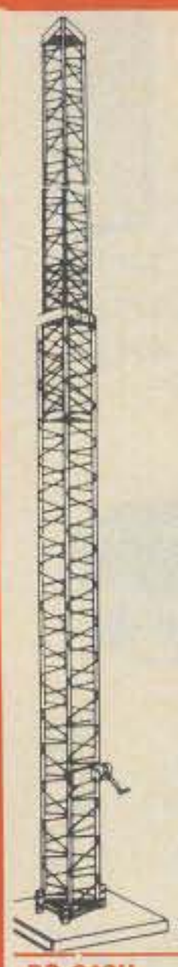
CIRCLE 68 ON READER SERVICE CARD

ANTENNA/TOWER SALE!



hy-gain

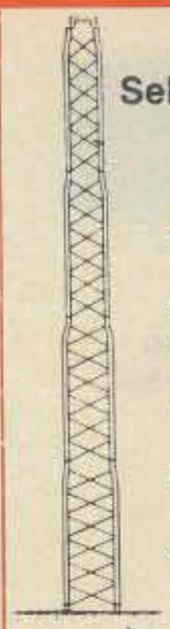
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft.	9 sq. ft.,	$ 967
HG52SS	52 ft.	9 sq. ft.,	$ 959
HG54HD	54 ft.	16 sq. ft.,	$1499
HG70HD	70 ft.	16 sq. ft.,	$2399

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	$319
HBX48	48 ft	10 sq ft	303	$399
HBX56	56 ft	10 sq ft	385	$489
HDBX40	40 ft	18 sq ft	281	$379
HDBX48	48 ft	18 sq ft	363	$469

***Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.**

Tri-Ex®

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

Check these features:
- **All steel construction**
- **Hot dip galvanized after fabrication**
- **Complete with base and rotor plate**
- **Totally self-supporting—no guys needed**

Model	Height Up	Down	Wind Load	List	Sale
W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$999
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$2999
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

BUTTERNUT ELECTRONICS CO.

- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES . . .
- New Model HF6V $129.00
- New Model TBR-160HD (High Power 160 meter Base Resonator) $49.00.

Model RMK-11 (roof mount kit with multiband radial kit $39.00. Model STR-2 (Stub Tuned Radial Kit) $29.00.

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)

RG-213U

$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

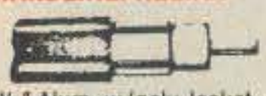
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Non-contaminating Vinyl Jacket
- Low Loss Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™



Lowest Loss for VHF/UHF!

- ½" Alum. w/poly Jacket . . . . . $.79/ft
- ½" LDF4-50 Andrew Heliax ™ $1.69/ft
- ⅞" LDF5-50 Andrew Heliax ™ $3.99/ft

select connectors below.

HARDLINE & HELIAX ™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax ™	$22	$22	$22	$22
⅞" Heliax ™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 . . . $1.25 UG23D N Female . $2.95
UG21B N Male . $2.95

ANTENNA WIRE & ACCESSORIES

12 Ga. Copperweld $.12/ft 14 Ga. Copperweld $.10/ft
14 Ga. Stranded . $.10/ft 18 Ga. Copperweld ¼ mi $30
450 Ohm H.D. Line $.16/ft H.D. End Insulators . $2/ea

Van Gorden 1:1 Balun $11
Van Gorden Center Insulator $6

HUSTLER

6BTV 80-10 mtr Vert . $129
4BTV 40-10 mtr Vert $89 5BTV 80-10 mtr Vert . $109
G6-144B 2-mtr Base $89 G7-144 2-mtr Base . $119

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$12	$12	$15	$18	$22
2KW Super	$18	$20	$22	$26	$36

Bumper Mounts - Springs - Folding Masts in Stock!

CUSHCRAFT

MULTI-BAND HF ANTENNAS

A3 3-el Tribander $219 A4 4-el Tribander $289
R3 20/15/10mtr Vert $279 A743/A744 40mtr Kit $75

HF MONO-BAND ANTENNAS

10-3CD . . . $ 95 10-4CD . . . $109
15-3CD . . . $119 15-4CD . . . $129
20-3CD . . . $199 20-4CD . . . $279
40-2CD . . . $289 D40 . . . $149

VHF/UHF BEAMS

A50-5 . . . $ 79 617B . . . $199
214B . . . $ 79 3219 . . . $ 95
220B . . . $ 95 424B . . . $ 79

OSCAR/TWIST ANTENNAS

A144-10T . . . $ 52 A144-20T . . . $ 75
A147-20T . . . $ 63 416TB . . . $ 59
A14TMB . . . $ 29 PS4 . . . $ 69

VHF/UHF FM ANTENNAS

A147-4 . . . $ 29 A147-11 . . . $ 49
214FB . . . $ 79 228FB . . . $219
A449-6 . . . $ 29 ARX2B . . . $ 39

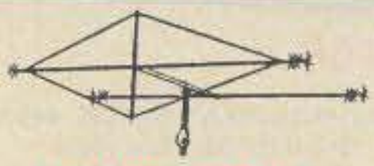
HY-GAIN

Explorer-14, In Stock—$289

- QK710 30/40 mtr. Add-On-Kit $79.00
- V2S 2-mtr Base Vertical $39
- TH5MK2S Broad Band 5-el Triband Beam $389
- TH7DXS 7-el Triband Beam $439
- TH3JRS 3-el Triband Beam $179
- TH2MK3S 2-el Triband Beam $159
- HY-QUAD 2-el Triband Quad $299
- 402BAS 2-el 40-mtr Beam $219
- 205BAS 5-el 20-mtr Beam $329
- 155BAS 5-el 15-mtr Beam $189
- 105BAS 5-el 10-mtr Beam $129
- 204BAS 4-el 20-mtr Beam $249
- 203BAS 3-el 20-mtr Beam $149
- 153BAS 3-el 15-mtr Beam $89
- 103BAS 3-el 10-mtr Beam $69
- DB1015BAS 3-el 10/15 mtr Beam $179
- 64BS 4-el 6-mtr Beam $59
- 66BS 6-el 6-mtr Beam $119
- 18HTS 80-10 mtr Hy-Tower Vertical $429
- LC-160 160-mtr Coil Kit for 18HTS $39
- 214 14-el 2-mtr Beam $39
- 2BDQ 80/40 mtr Trap Dipole $59
- 5BDQ 80-10 mtr Trap Dipole $119
- BN86 80-10 mtr KW Balun W/Coax Seal $19

MOSLEY

- CL-33 3-el Triband Beam $279
- TA-33 3-el Triband Beam $249
- TA-33JR 3-el Triband Beam $189
- TA40KR 40mtr Kit for TA33 . . . . . $119



MINI-PRODUCTS HQ-1

LIST $182.50 SALE $159

- Wing Span - 11 ft
- Wind Area - 1.5 sq ft
- Boom - 54 in. long
- 1200W P.E.P. Input

ALPHA DELTA COMMUNICATIONS

Transi-Trap ™ Surge Protectors—In Stock Now!

- Model LT 200W UHF Type . . $19
- Model HT 2KW UHF Type . . $29
- Model LT/N 200W N Type . . $39
- Model HT/N 2KW N Type . . $44
- Model R-T 200W Deluxe . . . $29
- Model HV 2KW Deluxe $32

KLM

- KT34A 4-el Broad Band Triband Beam $339
- KT34XA 6-el Broad Band Triband Beam $489
- 80m-1 80-mtr Rotatable Dipole $469
- 40m-1 40-mtr Rotatable Dipole $179
- 40m-2 2-el 40-mtr Beam $309
- 40m-3 3-el 40-mtr Beam $439
- 40m-4 4-el 40-mtr Beam $649
- 20m-6 6-el 20-mtr Beam $689
- 15m-6 6-el 15-mtr Beam $439
- 10m-6 6-el 10-mtr Beam $259
- 10-30-7LPA Log Periodic Beam $639
- 2m-13LBA 13-el 2-mtr Beam $79
- 2m-14C 14-el 2-mtr Satellite Antenna $89
- 435-18C 435 MHz Satellite Antenna $65
- 432-16LB 16-el 432 MHz Beam $69

ROTORS & CABLES

- Alliance HD73 (10.7 sq ft rating) $109
- Alliance U100 (for small beams & elevation) $49
- Telex HAM 4 (15 sq ft rating) $199
- Telex Tailtwister (20 sq ft rating) $249
- Telex HDR300 Heavy Duty (25 sq ft rating) $479
- Kenpro KR-500 Heavy duty elevation rotor . . . $189.00

Standard 8 cond cable $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

SOUTH RIVER ROOF TRIPODS

HDT-3 3 ft Tripod . . . . $19 HDT-5 5 ft Tripod $29
HDT-10 10 ft Tripod . . $49 HDT-15 15 ft Tripod . . $69
Heavy Duty Tripods include mtg hdw-UPS Shippable

ROHN GUYED TOWERS

10 ft Stack Sections

20G $37.50 25G $46.50
45G $107.50 55G $127.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$ 829
FK2558	58 ft	13.3 sq ft	$ 899
FK2568	68 ft	11.7 sq ft	$ 959
FK4544	44 ft	34.8 sq ft	$1159
FK4554	54 ft	29.1 sq ft	$1259
FK4564	64 ft	28.4 sq ft	$1359
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

TOWER/GUY HARDWARE

- 3/16 "EHS Guywire (3990 lb rating) . . . . . $.13/ft
- 1/4 "EHS Guywire (6000 lb rating) . . . . . $.16/ft
- 5/32 " 7 x 7 Aircraft Cable (2700 lb rating) . . . $.12/ft
- 3/16 "CCM Cable Clamp (3/16 " or 5/32 " Cable) . . $.35
- 1/4 "CCM Cable Clamp (1/4 " Cable) . . . . . $.45
- 1/4 "TH Thimble (fits all sizes) . . . . . $.30
- 3/8EE (3/8 " Eye & Eye Turnbuckle) $5.95
- 3/8 "EJ (3/8 " Eye & Jaw Turnbuckle) $6.95
- 1/2 "EE (1/2 " Eye & Eye Turnbuckle) $8.95
- 1/2 "EJ (1/2 " Eye & Jaw Turnbuckle) $9.95
- 3/16 " Preformed Guy Grip $1.99
- 1/4 " Preformed Guy Grip $2.49
- 6 " Diam - 4 ft Long Earth Screw Anchor $12.95
- 500D Guy Insulator (5/32 " or 3/16 " Cable) $1.39
- 502 Guy Insulator (1/4 " Cable) $2.49
- 5/8 " Diam - 8 ft Copper Clad Ground Rod $12.95

PHILLYSTRAN GUY CABLE

- HPTG2100 Guy Cable (2100 lb rating) . . . . . $.29/ft
- HPTG4000 Guy Cable (4000 lb rating) . . . . . $.43/ft
- HPTG6700 Guy Cable (6700 lb rating) . . . . . $.69/ft
- 9901LD Cable End (for 2100/4000 cable) $6.95
- 9902LD Cable End (for 6700 cable) $7.95
- Sockettast Potting Compound (does 6-8 ends) . . . $12.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$25	$39	$59	$79
.18 in Wall	$39	$69	$99	$109
.25 in Wall	$69	$129	$189	$249

TEXAS TOWERS

Telephone (214) 422-7306

VISA MasterCard

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Sat: 9am - 1pm

CIRCLE 22 ON READER SERVICE CARD

Ticket Talk

by Dick Bash - KL7IHP

Welcome to the July column of Ticket Talk, a column devoted to answering questions you may have about the amateur radio licensing structure. If you still have questions, please write to me either at *CQ* or at Bash Educational Services, Inc., P.O. Box 2115, San Leandro, CA 94577. If you can't wait for an answer, either call me at (415) 278-8275 or call your local FCC Field Office.

Advanced & Extra Class Questions Released to VEC's

At the time of this writing (May 9th), the news is that the FCC just released the 500 questions for the Advanced Class and 400 questions for the Extra Class that may be used on volunteer exams. This *does not* mean that there will be 500/400 questions on the tests! What this means is that **if you take the test from a volunteer examiner** (instead of from an FCC employee), the Volunteer Examiner Coordinator (VEC) will compose a written test for the General or Technician exam with 50 questions on it (70 if you don't have a Novice license), 50 questions on the Advanced, and 40 questions on the Extra Class written test. This is the same number of questions that the FCC currently has on their own exams. *The FCC will tell the VEC which questions to put on the test.* The VEC is not permitted to chose the questions to ask you. The questions will be worded *exactly* like they are in the FCC's PR Bulletin 1035 A (Novice), PR Bulletin 1035 B (Technician/General), PR Bulletin 1035 C (Advanced), or PR Bulletin 1035 D (Extra). Want a copy of these volunteer examiner questions? Simply write to or call the FCC and ask for them. The VEC will be required to come up with the answers to these questions. The FCC did not publish the answers! Nor did the FCC publish the source of the answers or the person who submitted them (except on the Novice bulletin).

Style of the Exam

The tragic problem is that this exam made up by the VEC may be multiple-choice, essay, or fill-in-the-blank. Personally, I think that any VEC who makes up an essay test should be shot at sunrise. First of all, they are tough to grade. Can you imagine the delays that would occur when 300 or so hams turned in their tests? Secondly, even though the FCC permits essay exams, they are very, very subjective tests. Hams want *objective* tests. Multiple-choice tests provide that objectivity. You either select the correct answer or you don't. There is no problem about interpreting what you really meant.

Where Can I Operate?

Every day I am asked what frequencies a particular class licensee can operate on. Below are the frequencies for the Novice and the Technician Class licensees and the emission types permitted. We don't have room this month for the General, Advanced, and Extra Class frequencies. Those will appear in next month's column. Clip this out, make a zillion copies of it, tape it up in your shack or your favorite ham store, and give it to everyone in your club!

NOVICE CLASS LICENSE

3700–3750 kilohertz (kHz)	A1
*7100–7150 kHz	A1
21100–21200 kHz	A1
28100–28200 kHz	A1

*When you are **not in Region 2** (which is basically North, Central, and South America), the 40 meter Novice frequencies are 7050–7075 kHz. Novices in the 50 States use 7100–7150 kHz.

If you are operating on any of the above Novice frequencies, *regardless of the class of license you hold*, you may not exceed 200 watts peak envelope power (PEP). Emission type A1 means CW for our purposes.

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50.1 to 54.0	A2,A3,A4,A5,F1,F2,F3,F4,F5
51.0 to 54.0	A0,F0
144.0 to 148.0	A1
144.1 to 148.0	A0,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5
220 to 225	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5
420 to 450	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5
1215 to 1300	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5
2300 to 2450	A0,A1,A2,A3,A4,A5, F0,F1,F2,F3,F4,F5,P
Gigahertz (GHz)	
3.300 to 3.500	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
5.650 to 5.925	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
10.000 to 10.500	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5
24.000 to 24.250	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
48.000 to 50.000	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
71.000 to 76.000	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
165.000 to 170.000	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
240.000 to 250.000	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P
Above 300.000	A0,A1,A2,A3,A4,A5,F0,F1,F2,F3,F4,F5,P

A0 and F0 are the same (for our purposes) and represent an unmodulated AM or FM carrier. An example would be holding your CW key down and not letting it up.

That's it for this month. See you in August with a list of the General, Advanced, and Extra Class frequencies. Get upgraded soon!

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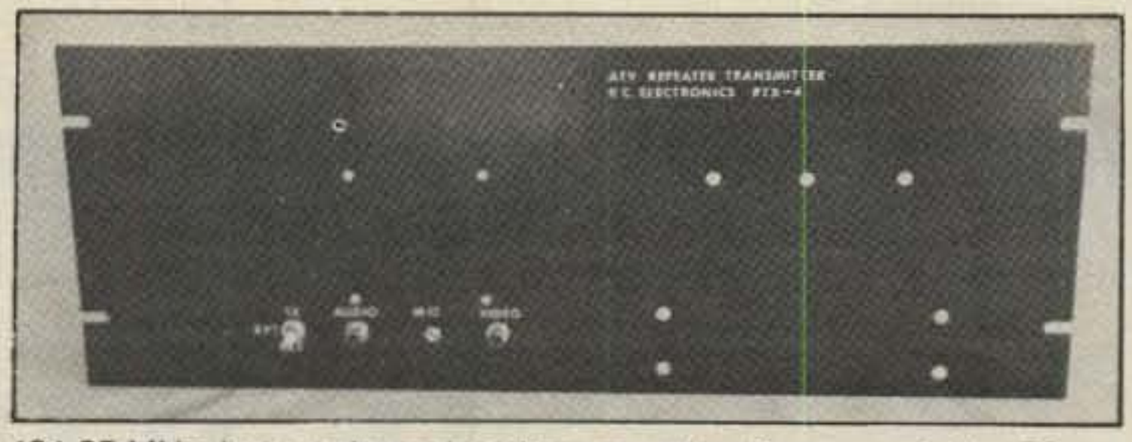
The tri-bander is small enough to operate mobile and large enough for a base rig. The unit is priced in the low $400's. For more information, contact NCG. Company, 1275 N. Grove St., Anaheim, CA 92806, or circle number 102 on the reader service card.

PC Electronics ATV Repeater Transmitter

A new 40 watt 70 cm ATV repeater transmitter has been introduced by PC Electronics. The 7 inch high 19 inch rack panel RTX-4 transmitter comes crystalled for the normal ATV repeater output frequency of



421.25 MHz, but can be ordered for any other frequency in the 70 cm amateur band between 420 and 440 MHz for emergency service bulletins, NASA Space Shuttle video, etc. The transmitter accepts the normal 1 volt composite, color or black and white, and mike or line audio. The RTX-4 contains the VOR module which prevents false keying from other modes that may be sharing the repeater input frequency range.

Power requirements are a regulated 13.8 v.d.c. at 8 amps and 120 v.a.c. at 0.1 amp for operation. For more information, contact PC Electronics, 2522 S. Paxson Lane, Arcadia, CA 91006, or circle number 105 on the reader service card.

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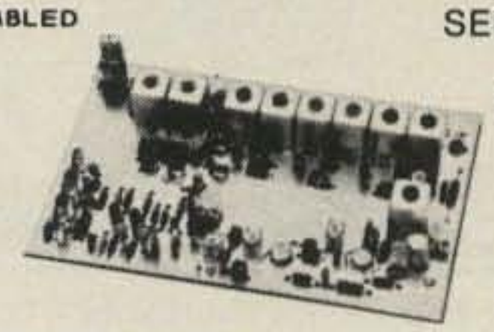

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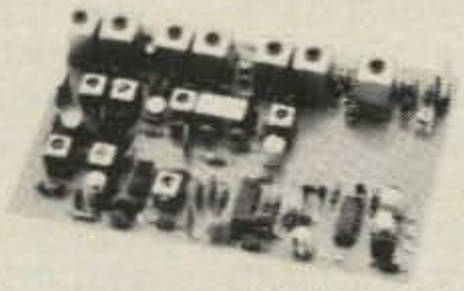

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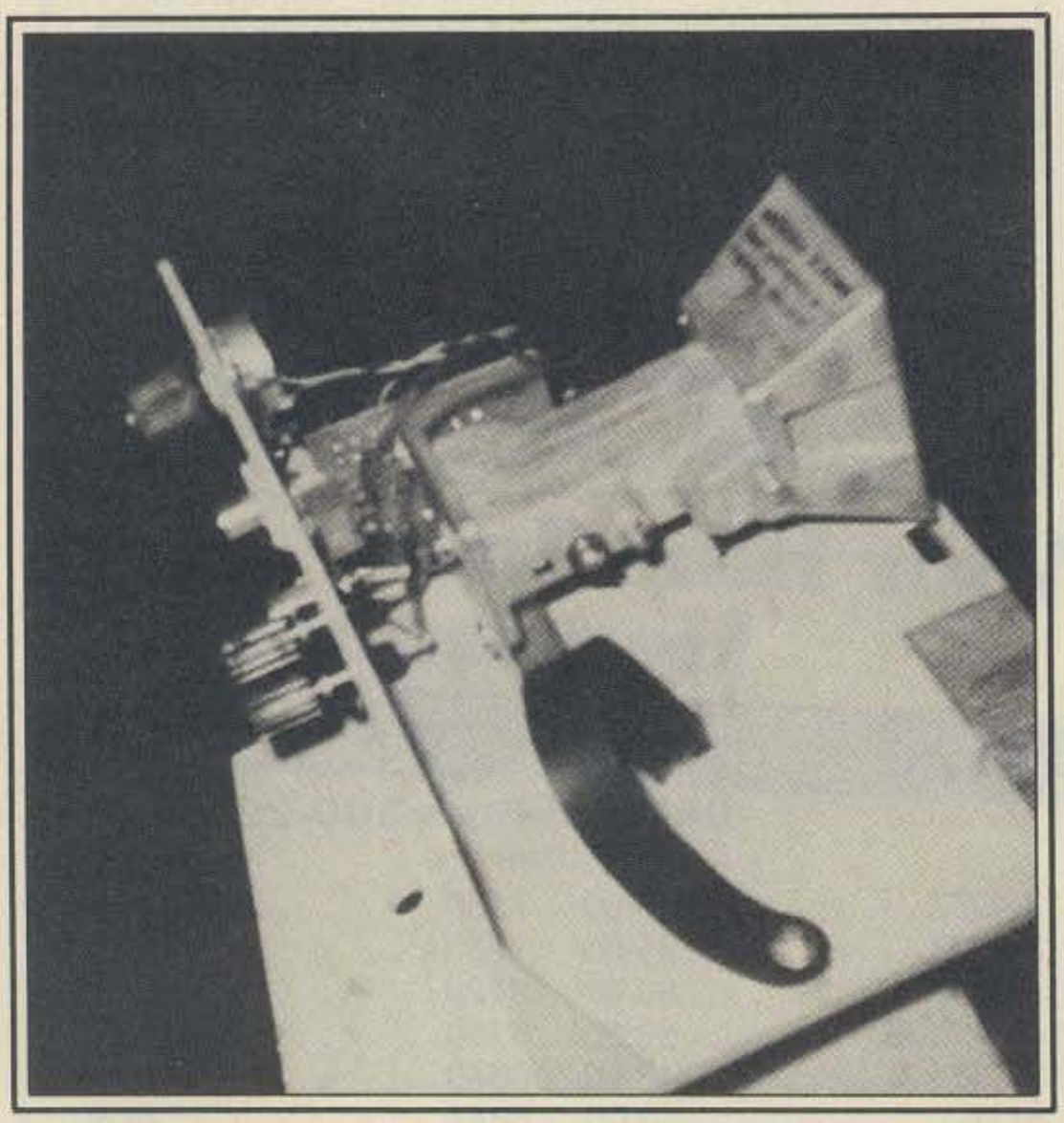
CIRCLE 74 ON READER SERVICE CARD

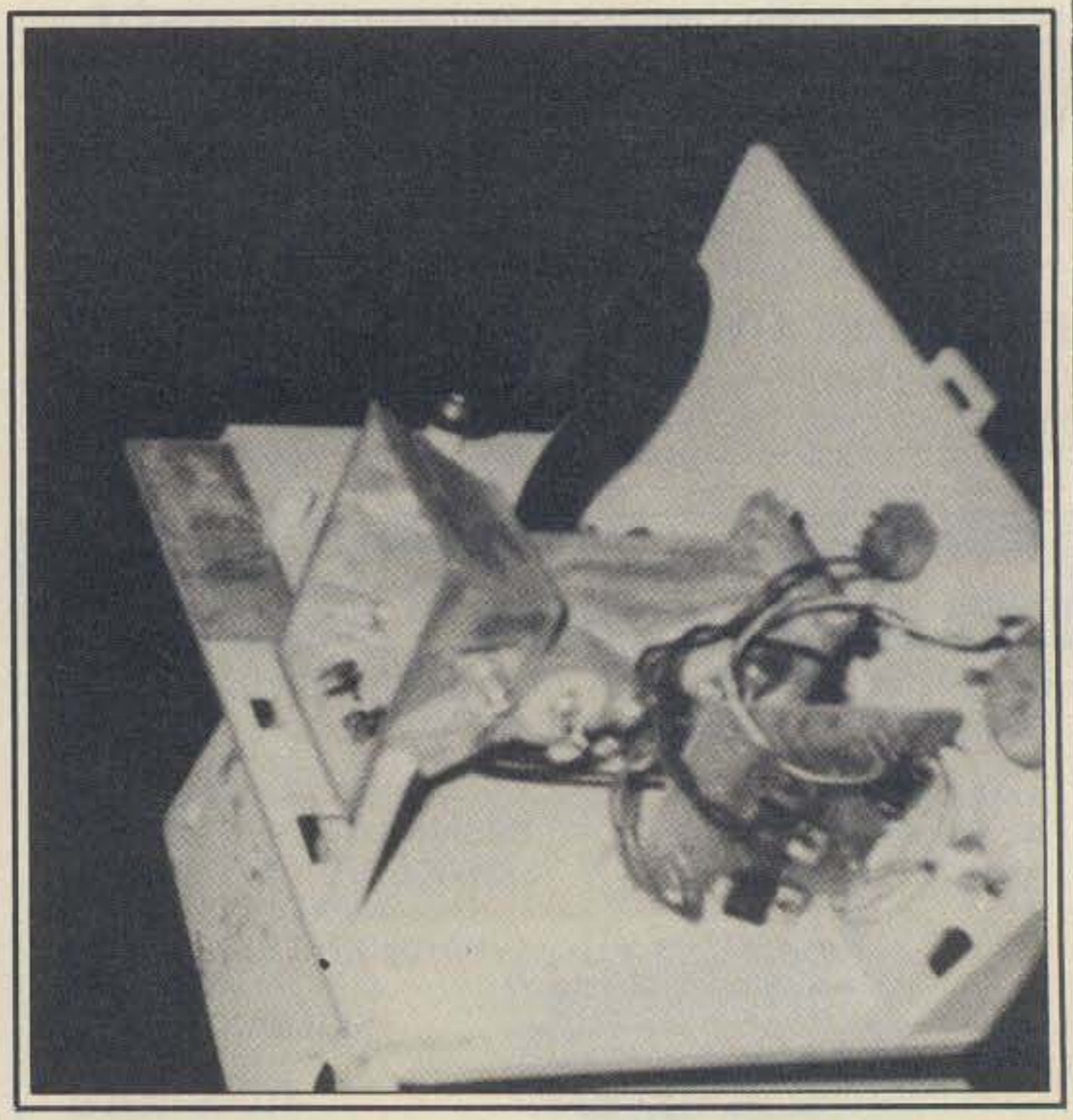
Here's something new to ponder as you wonder what's left for you to get involved with in amateur radio.

10 GHz ATV THE EASY WAY

BY ED SULLIVANT*, WB5MAP



The 10 GHz transceiver. Note the position of the brass turning screw with locknut just to the rear of the horn.



The 10 GHz transceiver showing the modulator and connections to the Gunn diode and mixer diode.

I met Ed Sullivant, WB5MAP, at the Wheaton Hamfest in Chicago last winter. He had a fascinating exhibit of microwave ATV, and it was easy to get hooked on the idea. I asked him about writing up the system for CQ, and he told me that he had written it for submission to A5 *magazine, but if the editor, Mike Stone, didn't mind, we both could run it. Mike didn't and ran it first in the April issue of* A5 *on page 24. I held it for this v.h.f. issue.* —K2EEK

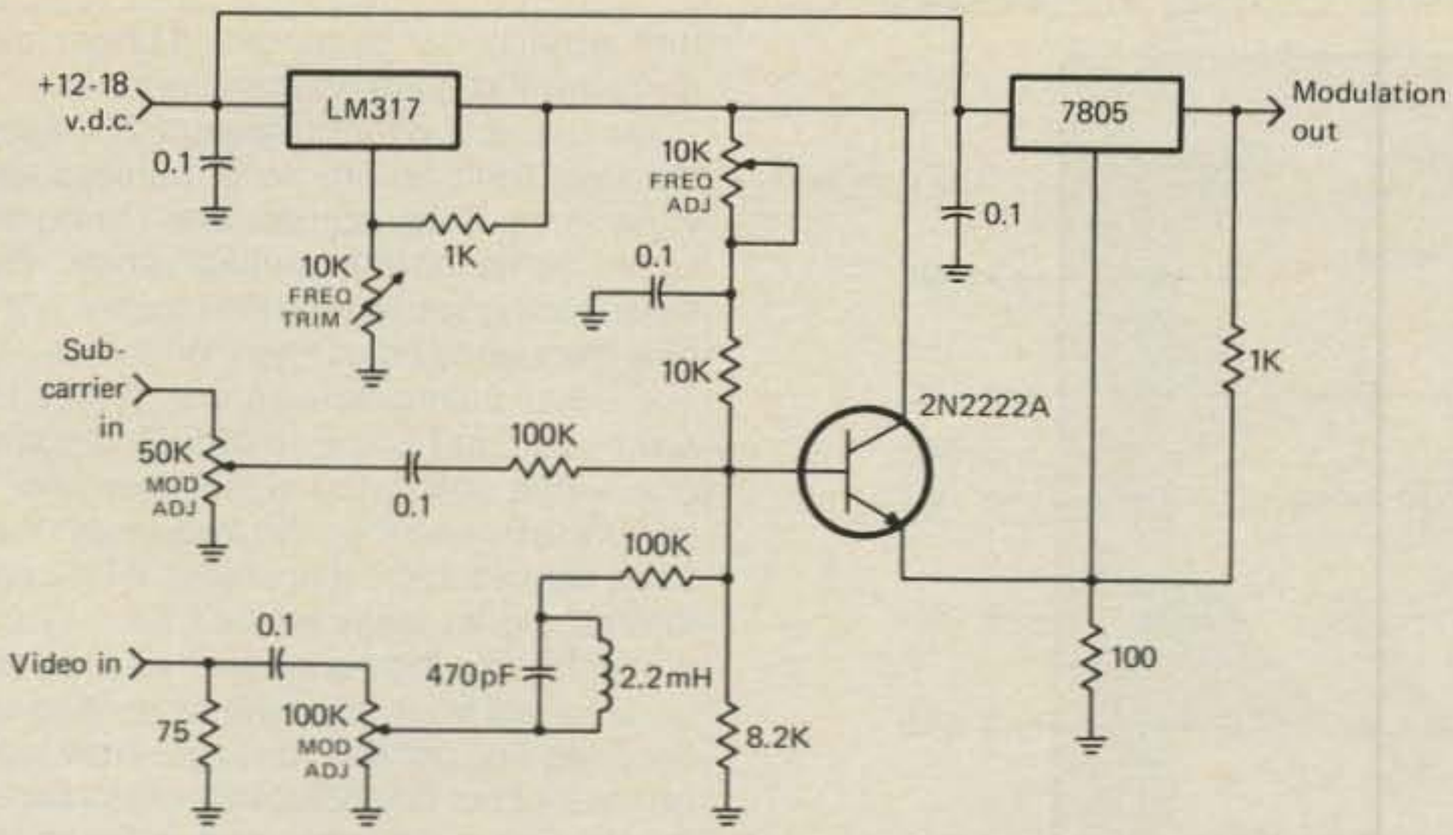
*1112 17th Ave., Plattsmouth, NE 68048

This article is for people who like to tinker with simple things that are inexpensive. Yes, I have been called simple-minded and so tight that my main spring broke. Anyway, with a modest amount of scrounging it is possible to get on 10 GHz easily and with very little cost. Not counting the camera (or video source such as a computer) and a TV, all the parts came from scrounging or the junk box.

Microwave motion detectors used in burglar alarm systems are slowly going out of service. Evidently, they present false alarms too often and not many want to bother fixing them. They operate just out of the 10 GHz amateur band and can tune through the amateur band without any trouble.

I scrounged the motion detectors from two businesses. Each source stipulated that they wouldn't be returned to security or alarm service. In fact, all I wanted was what they referred to as the "source," which was the 10 GHz cavity and feedhorn. Everything else went into the junk box. One business is a small part-time business repairing alarm systems in a basement. He had several units in a corner with defective "sources" which he gave me as soon as he knew why I wanted them. The second business is a national company that is taking them out of ser-

Say You Saw It In CQ



Parts List

1 – LM317 adjustable voltage regulator
1 – 7805 + 5 volt regulator
1 – 2N2222A
4 – 0.1 microFarad disk capacitor
1 – 470 picoFarad capacitor
1 – 2.2 microHenry coil
1 – 100K trimpot
1 – 50K trimpot
1 – 10K trimpot
1 – 10K pot
1 – 75 ohm ⅛ watt resistor
1 – 100 ohm ⅛ watt resistor
2 – 1K ohm ⅛ watt resistor
1 – 8.2K ohm ⅛ watt resistor
1 – 10K ohm ⅛ watt resistor
2 – 100K ohm ⅛ watt resistor

Fig. 1– The WB5MAP ATV modulator schematic.

vice as soon as they break. In the first case eight out of nine worked, and in the second case four out of nine worked. Even in the case of bad Gunn diodes, the diodes only cost about $20. Another source can be found later in this article.

The Gunn diode motion detectors come in at least three types. A transceiver has a mixer in the cavity with the Gunn diode. A transmit-only has a Gunn diode, no mixer, and therefore cannot receive. A transmit-receive combination has separate transmit and receive cavities with the r.f. coupled to the receive cavity with a short piece of hardline. I have only experimented with the transceive and the transmit-only types, but I can see no reason why the transmit-receive combination wouldn't work like the transceivers.

Theory of Operation

The Gunn diode oscillator works comfortably on 6.5 to 8.5 volts with little change in output power. If this voltage had video or other voltage superimposed on it, we would have an oscillator with a little a.m. and some f.m. characteristics. Just like Bob Richardson, W4UCH, of the *The Gunnplexer Cookbook*[1], I don't know how it works. I won't go as far as to call it the Sullivant effect, but it is the easiest mode of amateur radio operation I have found yet, and the cheapest.

The 7805 regulator rides 5 volts above a reference point determined by the conduction of the transistor. A 2N2222A was used in the circuit shown. Any general-purpose NPN transistor with medium (50–100) gain with the necessary frequency response for video will do. The bias resistors may have to be adjusted if a change is made. The LM317 regulator provides a stable reference for the transistor to work with. The **Freq Adj.** pot is a panel control.

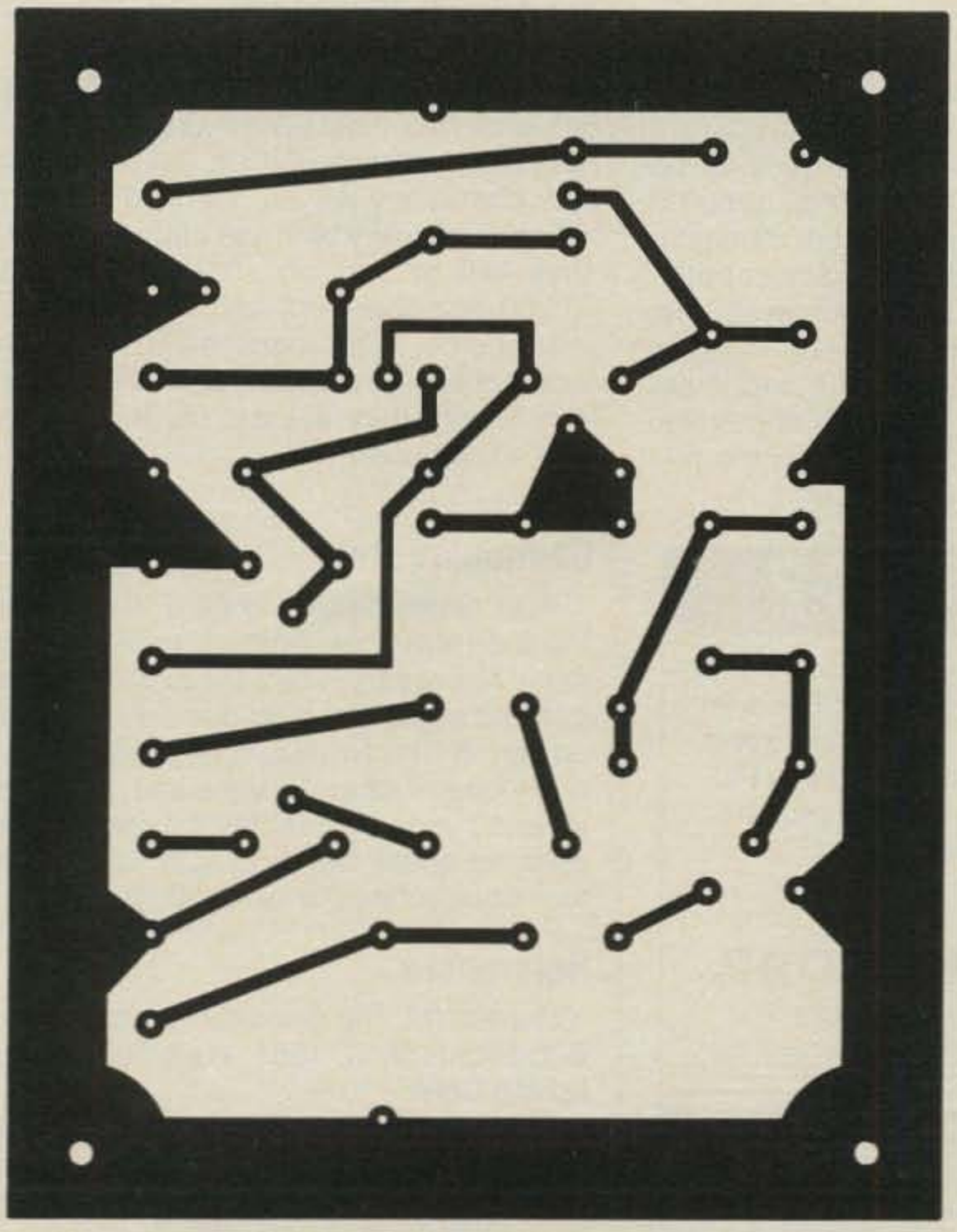
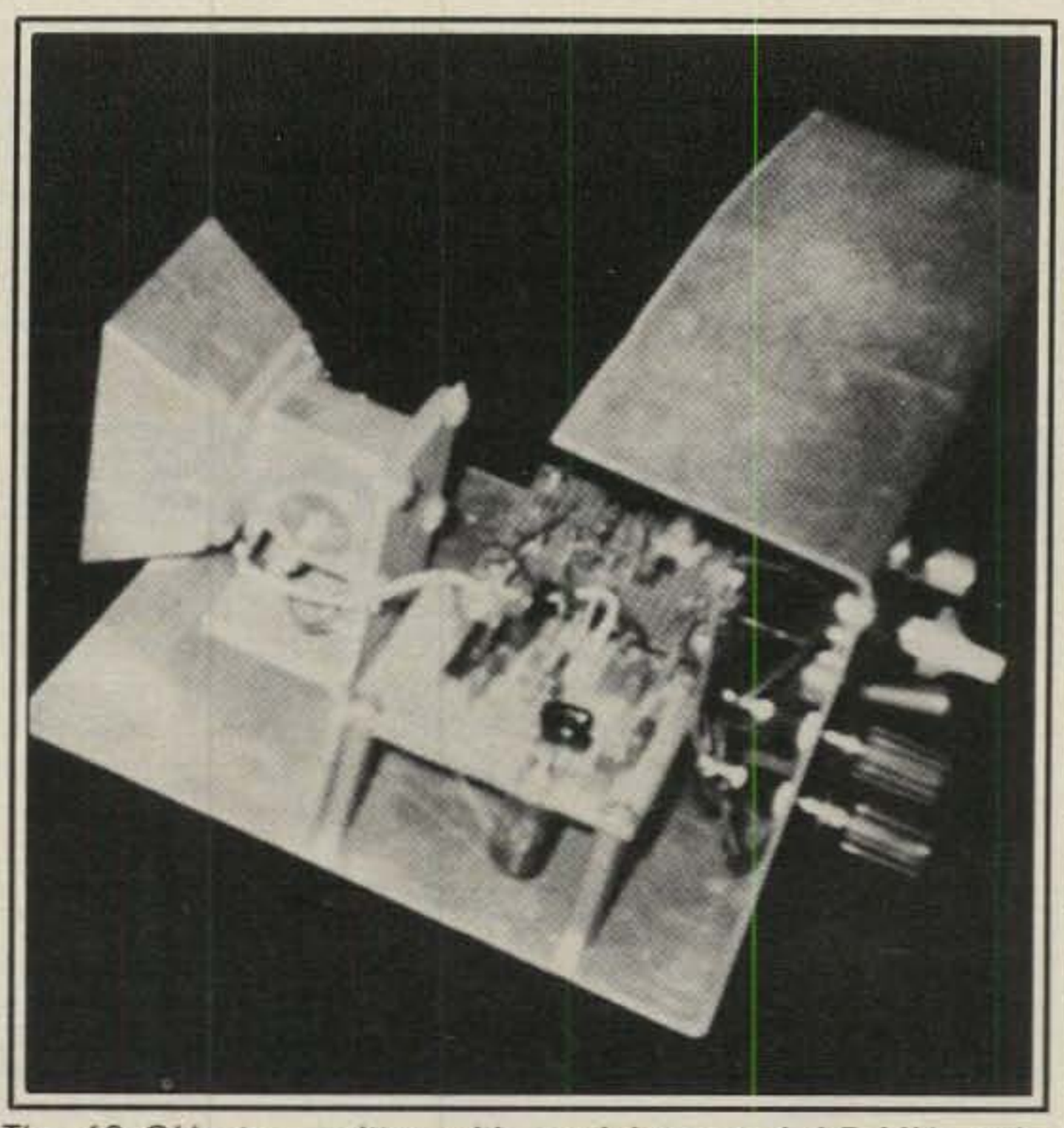


Fig. 2– Full-size PC board template.



The 10 GHz transmitter with modulator and 4.5 MHz sub-carrier generator.

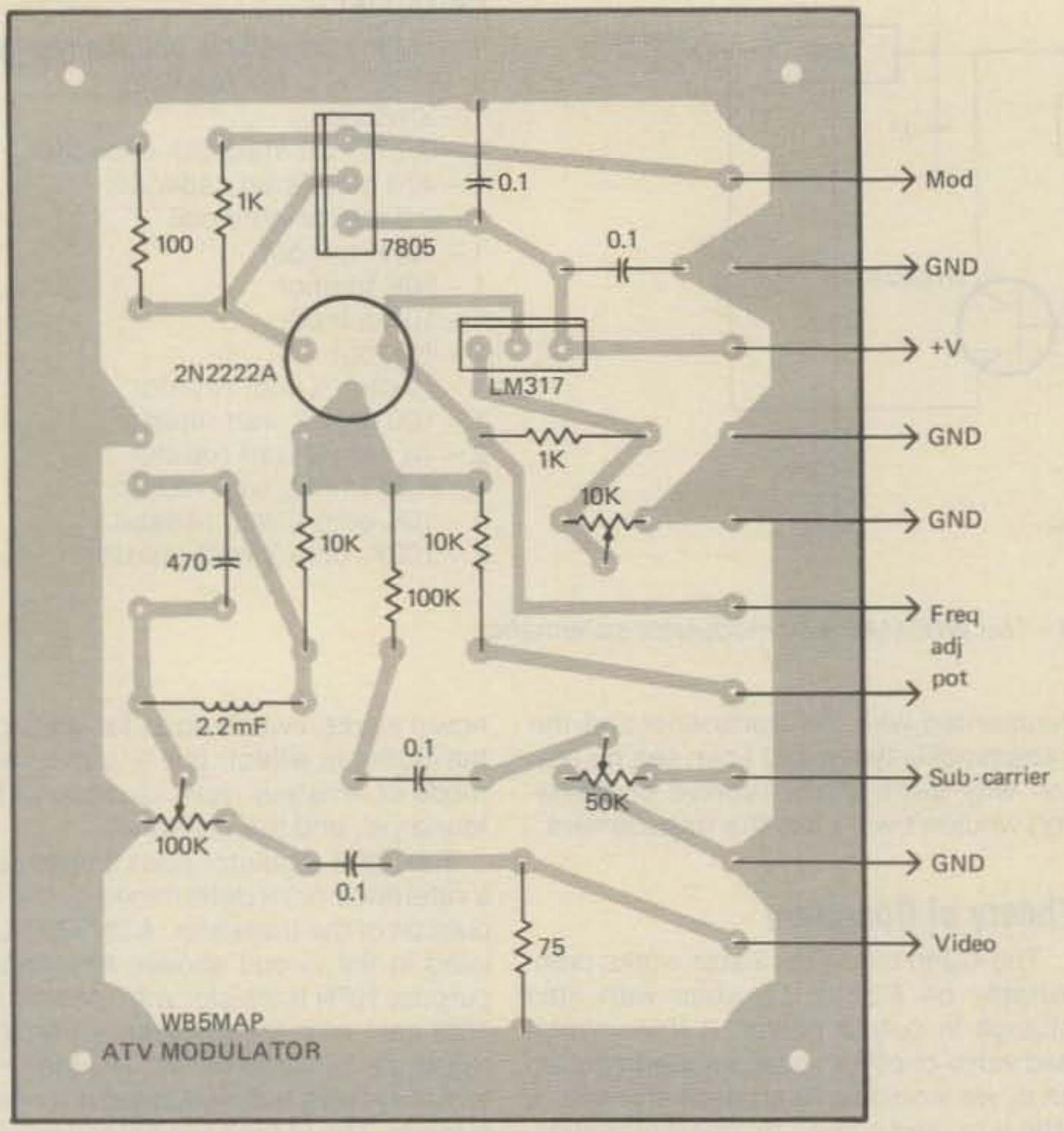


Fig. 3– Parts placement for the ATV modulator.

The **Freq Trim** pot is adjusted with the Freq Adj. panel control at minimum resistance for about 8.25 volts at the output of the 7805. You should now be able to adjust the output from 7.5 to 8.25 volts with the Freq Adj. pot. This corresponds to approximately 8 MHz or more than two TV channels.

The input circuit has both **Sub-carrier In** and **Video In** with a 4.5 MHz trap. You can use only the one you need and delete the other if it is not used. Start with the modulating input adjustment at maximum resistance and work down until the picture or audio is best.

A 4.5 MHz audio sub-carrier can be added very easily. The W6ORG circuit[2,3] works great with only one minor modification. I eliminated the output adjust pot.

The receive end is the simplest. Just connect a piece of RG59 through a balun to your TV. I have tried matching impedances at the mixer (about 2K ohms) and found nothing to gain bouncing the picture around my basement. Longer distances will require warmer weather.

Mechanically, tuning the cavity is easy, but I wouldn't recommend it unless tuning with the Freq. Adj. pot won't bring the signal in its normal tuning range. The brass tuning screw with the locknut is the only frequency adjustment on the cavity. The other tuning screws are mainly for s.w.r., so don't bother them. Find someone with a calibrated signal source or a method of measuring the frequency. Yes, there was a trick to this article. With a calibrated signal source (such as a Gunnplexer™), use the transceiver as a receiver. Connect your TV to the mixer and set the Freq Adj. pot at mid-range. Now loosen the locknut and adjust the brass screw for the first good white raster. Since the oscillator is above the amateur band, you are now at your reference frequency plus the frequency of the TV station you chose. Carefully tighten the locknut.

Circuit Notes

The circuit in the schematic has been tried with success with at least a half-dozen variations. Point-to-point wiring with standoffs on a single-sided PC board and pen-and-etch PC boards work equally well. Don't forget the decoupling capacitors. All resistors were ⅛ watt carbon or metal film. Component values can be substituted, but watch the bias on the transistor. I used 10-turn trimmers for ease of adjustment, but single-turn trimmers will work just as well.

A limited number of Gunn diode transceivers and transmitters taken from security service are available from Surplus Sales of Nebraska, 2412 Chandler Rd., Bellevue, Nebraska 68005, for a reasonable cost. They will be checked out and set on frequency with the circuit shown. They will be set on 10.250 GHz and 10.250 plus channel 2 and 3 ± 10MHz at your choice. The broard tolerance is because of possible temperature variations from where they are set up and where they will be used.

Cautionary Note

The Gunn diodes should not be removed from their holders unless absolutely necessary. They are extremely fragile and easily lost if dropped on a crowded bench. The Gunn diodes used are normally operated at 7.5 volts and can work up to 10 volts. Above this they tend to go poof, so check the modulator output before connecting the Gunn diode.

References

[1]Chapter 16, *The Gunnplexer Cookbook*, Bob Richardson, 1981, Ham Radio Publishing Corp.
[2]"FMA5 Audio Subcarrier Gen. Revisited," *A5 Magazine*, Tom O'Hara, May–June 1980.
[3]Page 14-32, *ARRL Handbook*, 1981.

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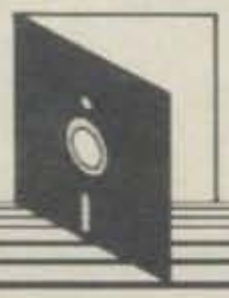

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LINE-OF-SIGHT
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TWO-TONE TEST
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Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Using Previous Novice Columns as a Source of Information

Many of the letters I receive contain requests for information that has been printed in previous Novice columns. It is reasonable to expect this to happen because there are Novice column readers new to amateur radio and to this column. Previous Novice column articles are grouped together in this month's column for the benefit of new and prospective amateurs. Experienced amateurs are urged to bring this information to the attention of those who are likely to want it. Items are arranged alphabetically within groups that are arranged in the probable sequence of their use. The month and year of the *CQ* issue containing the indicated article is listed beside the descriptive title of each item. A more extensive list of such aids is available at no charge to anyone who requests a copy of the "What's Hot" list and sends a business size (number 10) self-addressed, stamped envelope to me.

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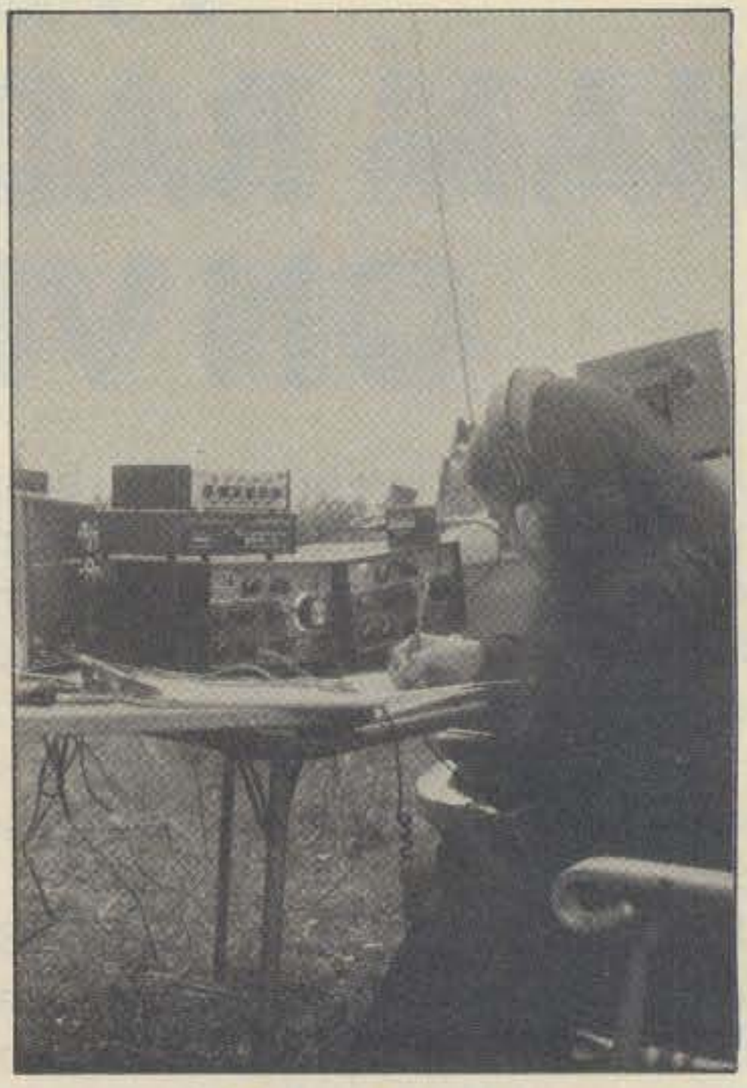

This is Monica Schalock, KA7OXV, operating the Novice station (KA7KDU) of the McMinnville Amateur Radio Club during the 1983 Field Day Contest. The location was 2000 feet up on Slide Mountain in Yamhill County, Oregon. Her husband is Steve, and his callsign is KA7OXW.

This is Robert Kaufman, KA7QPP, who resides in Cannon Beach, Oregon. He received his Novice license in July 1983, built a Heathkit HW-101 transceiver, and started operating. His present station includes an Icom 745 transceiver, Heath HW-101 transceiver, Hy-Gain 10/15 meter 3-element Yagi-Uda beam antenna, and a 6-band vertical antenna that he built from an article in the August 1983 issue of CQ. Robert is 44 years old, and he is in the U.S. Army National Guard. He has contacted amateurs in 33 states and 4 continents.

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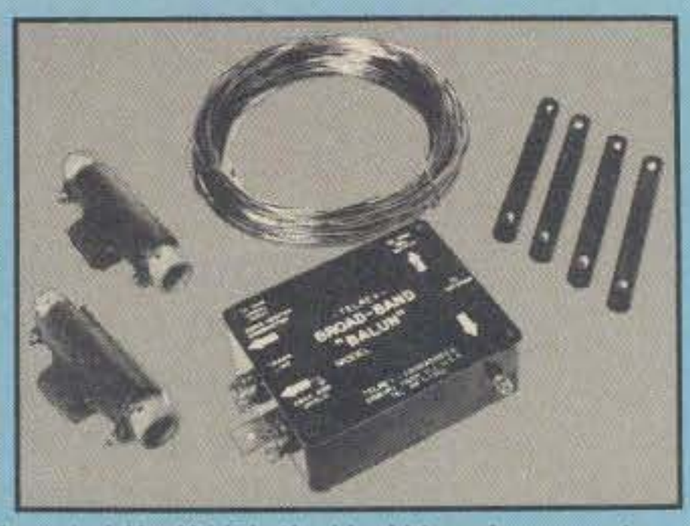

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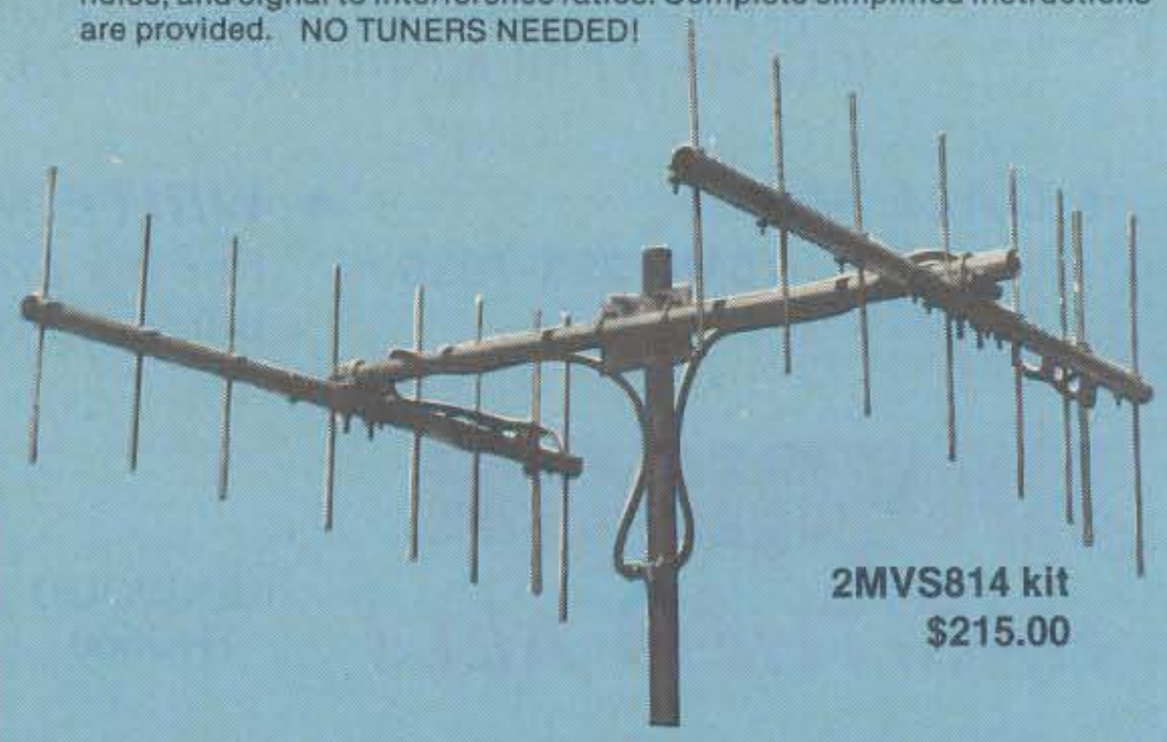

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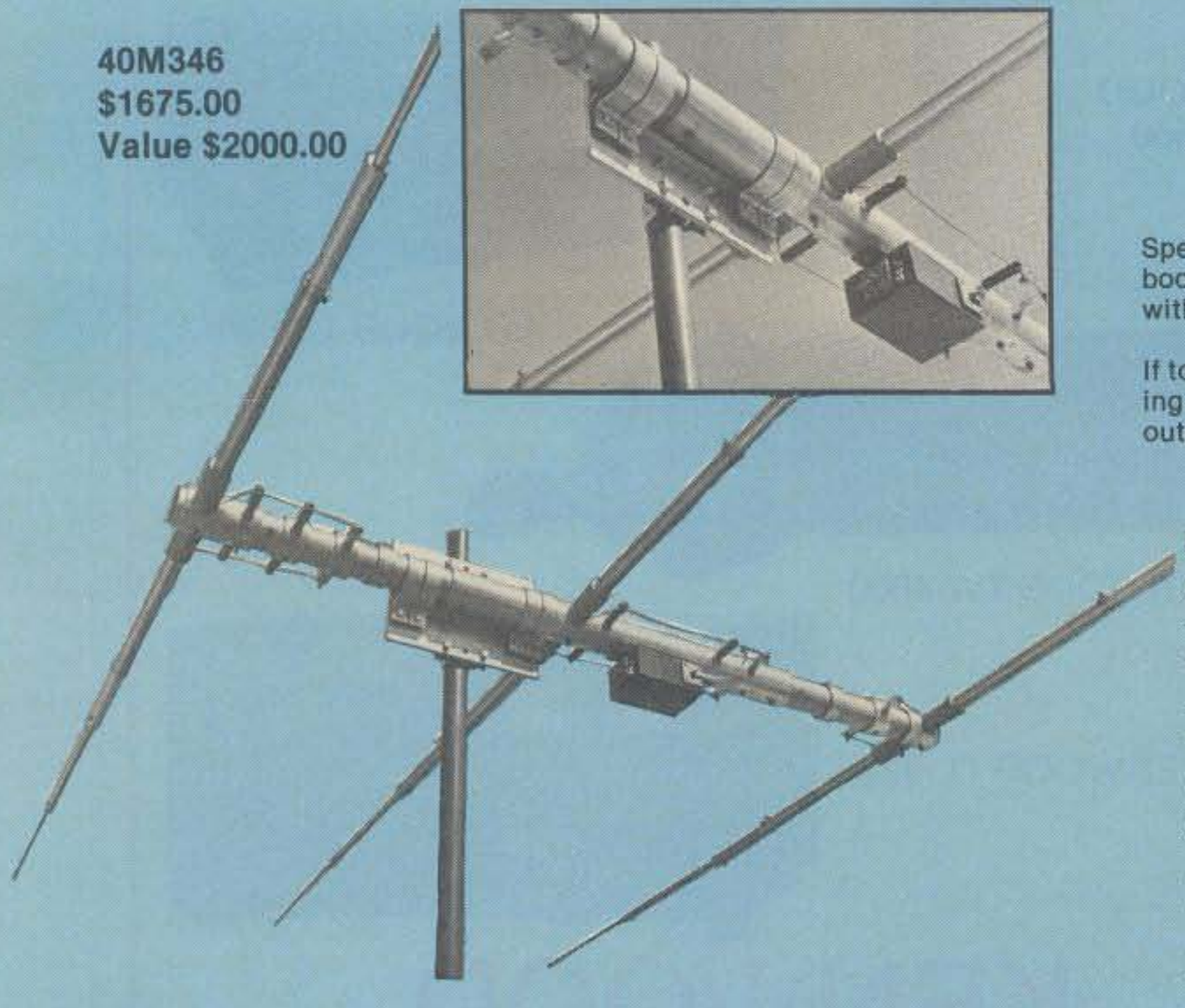

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20M536	20 Meter 5 element	(12 DBD)	660.00	**550.00**
20M646	20 Meter 6 element	(14 DBD)	1130.00	**945.00**
40M214	40 Meter 2 element	(5.6 DBD)	750.00	**625.00**
40M329	40 Meter 3 element	(8.3 DBD)	1145.00	**965.00**
40M346	40 Meter 3 element	(9 DBD)	2000.00	**1675.00**
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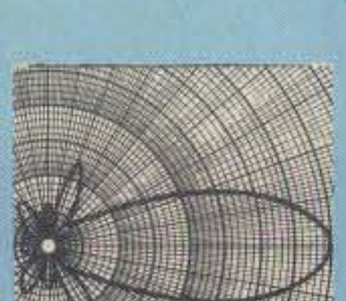

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Previous issues of *CQ* magazine are usually available from *CQ* for $2.00 each. The mailing address is 76 North Broadway, Hicksville, NY 11801.

Prefixes and Prefix Conversions

One of the confusion factors that confronts prospective and new amateur radio operators is the wide assortment of prefixes used. These prefixes should be considered allies because they make it easier for us to handle the infinitesimal (close to zero) to extremely large values that are common to radio and electronics theory. It is best to express each value using the prefix that results in the least number of zeroes and the simplest number. As an example, 3 milliamperes is easier to work with than 0.003 amperes, even though they are the same value. Similarly, 21.2 megaHertz is an easier value to use than 21,200,000 Hertz.

Unit prefixes are listed first to enable you to become familiar with the symbols, prefix designations, multiples/submultiples, and associated powers of ten. Do not let powers of ten bother you. Ten to the third power is just ten times ten (100) times ten (1000). In other words, 3.62 times 10^3 is simply 3.62 times 1000, or 3,620. A simple way to use powers of ten is just to move the decimal point left or right the number of steps indicated in the power of ten stated. In the previous example, ten to the third power is telling you to move the decimal point three places to the right, resulting in the value 3,620. If the value is stated as ten to the minus third power (10^{-3}), simply move the decimal point three places to the left; in this case, 3.62 times 10^{-3} becomes 0.00362. Try several sample values and you soon will become familiar with using powers of ten.

The prefix conversion chart is a self-explanatory and temporary aid that is useful, and it minimizes the possibility of errors when changing from any one prefix to another. Frequent prefix converting will bring familiarity such that this aid will be used only occasionally for reference purposes.

Unit Prefixes

Symbols	Prefixes	Multiples and Submultiples
E	exa	$1\,000\,000\,000\,000\,000\,000 = 10^{18}$
P	peta	$1\,000\,000\,000\,000\,000 = 10^{15}$
T	tera	$1\,000\,000\,000\,000 = 10^{12}$
G	giga	$1\,000\,000\,000 = 10^{9}$
M	mega	$1\,000\,000 = 10^{6}$
k	kilo	$1\,000 = 10^{3}$
h	hecto	$100 = 10^{2}$
da	deka	$10 = 10^{1}$
—	(Basic)	$1 = 10^{0}$
d	deci	$0.1 = 10^{-1}$
c	centi	$0.01 = 10^{-2}$
m	milli	$0.001 = 10^{-3}$
u	micro	$0.000\,001 = 10^{-6}$
n	nano	$0.000\,000\,001 = 10^{-9}$
p	pico	$0.000\,000\,000\,001 = 10^{-12}$
f	femto	$0.000\,000\,000\,000\,001 = 10^{-15}$
a	atto	$0.000\,000\,000\,000\,000\,001 = 10^{-18}$

Notes:
Pico replaced micromicro — Giga replaced kilomega
Nano replaced micromilli — Tera replaced megamega

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an s.a.s.e. if a picture must be returned. A free one-year *CQ* subscription or renewal is awarded to the amateur whose picture I select as the winner for the month. If you are a subscriber, enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs who frequently work the American Novice bands are also urged to submit photographs. I have never received pictures from Novices in Connecticut, Hawaii, Louisiana, Utah, or Vermont.

Prefix Conversion Chart

This chart allows you to convert a unit with any stated prefix to one with any desired prefix. Follow the stated prefix line horizontally to the block where it bisects the vertical line for the desired prefix and simply move your present decimal point the number of places (and in the direction) indicated on the graph.

Stated Prefix	Desired Prefix: E	P	T	G	M	k	h	da	Basic	d	c	m	u	n	p	f	a
E	0	R3	R6	R9	R12	R15	R16	R17	R18	R19	R20	R21	R24	R27	R30	R33	R36
P	L3	0	R3	R6	R9	R12	R13	R14	R15	R16	R17	R18	R21	R24	R27	R30	R33
T	L6	L3	0	R3	R6	R9	R10	R11	R12	R13	R14	R15	R18	R21	R24	R27	R30
G	L9	L6	L3	0	R3	R6	R7	R8	R9	R10	R11	R12	R15	R18	R21	R24	R27
M	L12	L9	L6	L3	0	R3	R4	R5	R6	R7	R8	R9	R12	R15	R18	R21	R24
k	L15	L12	L9	L6	L3	0	R1	R2	R3	R4	R5	R6	R9	R12	R15	R18	R21
h	L16	L13	L10	L7	L4	L1	0	R1	R2	R3	R4	R5	R8	R11	R14	R17	R20
da	L17	L14	L11	L8	L5	L2	L1	0	R1	R2	R3	R4	R7	R10	R13	R16	R19
Basic	L18	L15	L12	L9	L6	L3	L2	L1	0	R1	R2	R3	R6	R9	R12	R15	R18
d	L19	L16	L13	L10	L7	L4	L3	L2	L1	0	R1	R2	R5	R8	R11	R14	R17
c	L20	L17	L14	L11	L8	L5	L4	L3	L2	L1	0	R1	R4	R7	R10	R13	R16
m	L21	L20	L15	L12	L9	L6	L5	L4	L3	L2	L1	0	R3	R6	R9	R12	R15
u	L24	L21	L18	L15	L12	L9	L8	L7	L6	L5	L4	L3	0	R3	R6	R9	R12
n	L27	L24	L21	L18	L15	L12	L11	L10	L9	L8	L7	L6	L3	0	R3	R6	R9
p	L30	L27	L24	L21	L18	L15	L14	L13	L12	L11	L10	L9	L6	L3	0	R3	R6
f	L33	L30	L27	L24	L21	L18	L17	L16	L15	L14	L13	L12	L9	L6	L3	0	R3
a	L36	L33	L30	L27	L24	L21	L20	L19	L18	L17	L16	L15	L12	L9	L6	L3	0

QRP

a monthly feature by
ADRIAN WEISS, K8EEG

THE ART OF VERY LOW POWER OPERATING

DXCC QRP Trophies #28 and #29

The DXCC QRPp Trophy #28, All S.S.B. #7, was awarded to Ronald Morais, K1MNR, who then became KF1H and decided to go for both modes. He succeeded and now also has DXCC QRPp Trophy #53, All C.W., both modes #2. I'm pleased to lead off with Ron's story. We've had many conversations on the phone, and his enthusiasm has always been a shot in the arm for me! It also shows through in his story. He writes:

"Many of you are certainly aware of the number of QRP operators on the bands these days. The number is increasing all the time, so more and more of you are likely to hear 'This is W1XYZ QRP.' To those who are not familiar with QRP, the term refers to operation with 5 watts output or less. I'm a very active QRPer and would like to share with you some of my exciting experiences.

"The last three years have been the most exciting in my 21 years as a ham, because I learned that working the world is possible with just a couple of watts. The trick is not 'how much punch' you have, but 'how you duck and weave'! More on that later.

"I bought an HW-7 in November 1975 and used it until March 1978. I had a lot of fun and couldn't help noticing that my QRO rig was just sitting there collecting dust. I sold it and bought a new Argonaut, the best idea I've ever had! What more could a guy ask for? The Argo runs 5 watts on both c.w. *and* s.s.b.! Well, when it came, I opened not only a box with a new rig in it, but a whole new world of ham radio! At first I wondered; did I waste my money? Will I be heard with only 2 watts output? As time went on, I realized that I didn't waste my money, and I could be heard quite well. Many signal reports have been 5 × 1, 'good audio but little signal,' and some have been 5 × 9. Many have commented that they would never have known I was running QRP unless I had told them.

"My first DX QSO with the Argo was with G3BDS on March 22, 1978. I was in the process of tuning around the bands looking for the last two states that I hadn't worked with the HW-7. Before I managed to find them, I worked 24 countries! By the time I received the QSLs for WAS QRPp, I'd worked all states again with the Argo. By October 1978 my log was graced

83 Suburban Estates, Vermillion, SD 57069

Ron Morais, K1MNR/KF1H, at his tidy QRP operating position. Just to the left of Ron's head, his DXCC QRPp #28—All S.S.B. #7 Trophy is visible on the top shelf. The Argo 509 occupies a central position on the second shelf. After completing DXCC QRPp on s.s.b., Ron decided to go ahead and do it again on c.w., becoming the second operator to win the award in both modes (WA2JOC was the first to do it). After a hectic year spent on the road on his job, Ron has been transferred to a position that requires no travel. What will he do with all his spare time? Naturally, try for DXCC Milliwatt!

with countries such as PY0, KV4, UA0, JR1, 8R1, YN1, and HB0, among others. By the end of the year I'd worked 37 countries and added HC1, VP2L, 8P6, VK2, FY7, 3D6, C6, and ZF. I'd worked all continents by February 1979, started working Asians on s.s.b., and by the end of 1979 I'd extended the list to include 9K2, 8Q7, ZL, LX, KA1, ZD8, ZD7, 7P8, 8Z4A, and others for a total of 83 countries worked. I reached the magic 100 level in March 1980 with 5Z4, 7X2, ZS6, TF, EA8, OH0, and CX. I mention these countries because I've only worked one of each and am thankful that most of them have QSLed. The QSO with 7X2LS was two-way QRPp, and I'd certainly like to receive a QSL from him eventually. However, I'd done it with 2 watts s.s.b.!

"When the CQ WW DX Contest came around in October 1980, I decided to look for a couple of new countries and attempt to duplicate those countries I had worked only on s.s.b. Well, the bug bit hard, because before I knew it, I was knee-deep in QSOs and getting nice reports in the contest. I stayed on 10 meters, and when the contest was over, I had worked 154 stations in 50 countries and 16 zones for a total of 28,050 points. That was my first contest! I wish I had had more time to spend at it, because I'm sure I could have done better. I'll get serious next time!

"Talking about my experiences brings to mind many of the stations I've worked who have made a special effort to give me a QSO. These QRO operators deserve an award for their extra efforts, and if someone came up with one, I would be willing to sponsor it ! I'm sure that there are many other QRP DXers out there who feel as I do. A QRPp operator is only as good as the operator at the receiving end! I can think of several stations who put in an extra effort for me and other QRPers during contests. Among these are 5N2DOG, VP5WW, and PJ2CC, who pulled me through the mess of QRM. A4XIH and YJ8NPS were working stateside stations by area, and when they called an area and got no response, I asked, 'How about QRP?' They responded, completed the contact, and then listened for other QRPers. WD9GDR/TF made an extra special effort because the band wasn't really that great. He pulled me through, and to make that contact more meaningful, his QSL came in as number 100! What a day that was! Then, QSLing is important. I'd like to thank ZS6ALE and VP5SDA/HK1 for sending QSL cards directly to me after I explained that I needed them for my DXCC QRPp.

"Speaking about QSLing, I have to comment on this part of the DXCC QRPp process. Getting 100 countries to QSL for DXCC is no easy or cheap effort! I found waiting for the QSLs more frustrating than looking for and working DXCC! Talk about stress! I found myself swearing at the mailman, the QSL bureau, and all the s.a.s.e.'s and s.a.e.'s with IRC's because I wasn't getting any responses! To give you the picture, I had worked 100 by March 1980, and #100 wasn't confirmed until January 1981! And there's still a lot of postage floating around out there because I've worked 135 at this time. I've worked about 1000 DX stations, and if the QSLs would come through, I'd be floating in a stack of about 400!

"In closing, I'd like to pass along a few pointers about operating QRPp DX. Some will sound familiar, but they're important anyhow. (1) First and most important, the pursuers of peanut power must preen their patience and perseverance plumage! (2) Never call 'CQ DX'; it's a waste of time. (3) Wait until the pile-up clears, and then repeat 'QRP QRP' with your call. The guy just might hear you. (4) Catch the DX station when he asks if the frequency is in use. This works and will surprise them. After you swap reports, the band will be 30

Say You Saw It In CQ

DXCC QRPp Trophy (under 5 watts output)

Trophy No./Endorsement	Call	Name	Date
1	K4OCE	Robert Rosier	12/71
2	W2GRR	Sanford D. Sadowsky	6/75
3	K8MFO	Don Karvonen	2/76
4, S.S.B. #1	W6PQZ	John K. Akiyama	4/76
5	K2KUR/N2AA	Eugene Walsh	5/76
6	OA8V	Paul Wyse	5/77
7	WA6SOV	Lee Williams	7/77
8	G4BUE	Christopher J. Page	11/78
9	OE1ZGA	Tom Gabbert	3/79
10	WA2JOC	William W. Dickerson	3/79
11	WB8IGU	Howard G. Hawkins	7/79
12	VE1BQQ	Leon J. Fitzgerald	11/79
13, S.S.B. #2	W6YVK	Everett D. Willis	2/80
14, S.S.B. #3	K4RUG	Charles Hoffman	3/80
15	W1PWK	Richard M. Vacca	3/80
16, S.S.B. #4: Both Modes #1	WA2JOC	William W. Dickerson	3/80
17	VE5JQ	John Dudley	3/80
18, S.S.B. #5	N0AJZ	Lanny C. Rather	4/80
19	K0CDJ	William P. Wilson	5/80
20, All C.W.	OK1DKW	Petr Doudera	6/80
21	SM5CCT	Bengt Eriksson	6/80
22, All C.W.	SM0GMG	Lars Mohlin	7/80
23	WA4LOF	Richard E. Schier	7/80
24, All C.W.	KH6HC	Tatsuro Suzuki	7/80
25, S.S.B. #6	GM3RFR	Samuel S.S. Polson	8/80
26	K4TWJ	Dave Ingram	9/80
27	K8DU	Al Bhar	9/80
28, S.S.B. #7	K1MNR	Ronald D. Morais	1/81
29	VK7NRT	Rai Taylor	2/81
30	AB0X	Michael Crabtree	3/81
31, S.S.B #8	WB9OAR	Dan Reimer	6/81
32, S.S.B. #9/All 10m	K2OQA	Edward A. Borow, Jr.	6/81
33, S.S.B. #10	KB3PD	Richard Phillips	7/81
34, All C.W.	AB0M	C.L. "Vern" Lang	7/81
35	WA0VBW	Randal M. Shirbroun	9/81
36, All C.W.	WD8RYY/KM8X	Chris Hethorn	10/81
37, S.S.B. #11	WB8CTC	Joe McCready	11/81
38	KB9JJ	Matt Teicher	12/81
39	N0ZA	Ross Harrell	12/81
40, Half-Century of QRP Contributions	W9PNE	Brice Anderson	2/82
41	GM4ELV	Daibhidh Dhuglas	5/82
42	AD2Y	Michael Akiki	5/82
43	CX7BBB	Antonio Villano	6/82
44, All C.W.	VK4SS	Alan Shawsmith	7/82
45	WB4SXX	Bill Meacham	10/82
46, S.S.B. #12	KK9Q/N9AII	Michael J. Wendland	10/82
47	KH6CP	Zachary Lau	12/82
48	JA6VZB	Toshiyuki Moriyama	1/83
49	N8CQA	L.T. "Buck" Switzer	1/83
50	WB9WIC	Lawrence S. Schulman	4/83
51	AA2U	Randy Rand (son)	4/83
52	K2RF	Henry T. Rand (father)	4/83
53, All C.W./ Both Modes #2	KF1H (K1MNR)	Ronald D. Morais	5/83
54	NN4Q	Sam Burgin	5/83
55, S.S.B. #13	OE1SBA	Ing. Bruno Settinger	6/83
56	KH6OA	J. Dean Paterson	6/83
57, S.S.B. #14/ All 10m #2	N1BZG	Fred Sterner	7/83
58	W0RSP	Adrian Weiss	8/83
59	W6SKQ	Robert E. Spidell	9/83
60, S.S.B. #15	VK6RF	Raymond F. Miller	10/83
61	WB2IPX	Les Shattuck	10/83
62, All C.W.	NF4Z	E. Stuart Gregg III	11/83
63, All C.W.	K9PNG	James H. Jones	12/83

DXCC Milliwatt Trophy (under 1 watt output)

1, S.S.B. #1	W8ILC	Ronald Moorefield	6/78
2, All C.W.	GM3OXX	George Burt	12/78
3	G4BUE	Christopher J. Page	12/79
4	KI4W	Margaret H. Williams	2/80
5, All C.W.	W4IV	William Montgomery, Jr.	11/81
6, All C.W.	EA8EY	A. Montero Martin	4/83
7	JA1MCU	Jiro Manaka	4/83
8	GM4ELV	Daibhidh Dhuglas	5/83

DXCC Milliwatt 200 Plaque (under 1 watt output)

1, S.S.B. #1	W8ILC	Ronald Moorefield (293 confirmed)	4/80

DXCC 300 Milliwatt Trophy

1, S.S.B. #1	W8ILC	Ronald Moorefield	2/84

DXCC 200 QRPp Plaque (under 5 watts output)

1	N2AA	Eugene Walsh	12/78
2	G4BUE	Christopher J. Page	12/80
3	WA4LOF	Richard E. Schier	5/81
4	WA6SOV	Lee Williams	6/82
5	WB8IGU	Howard G. Hawkins	12/82

kHz wide in QRM. Remember, first is best! (5) Use world-wide accepted phonetics on s.s.b. (6) Accept and live with the words 'QSL VIA BURO'; it takes patience, believe me! (7) Have a strong heart, especially when an 8Z4, U0Y, or YJ8 returns your call! QRP is not for the weak in heart; the thrills are too great. (8) Pray for good propagation. (9) Listen a lot. A keen ear will net contacts from stations the big guns don't hear. A lot of them only respond to 5 × 9 + 40 dB signals. In the final analysis, I can only say that *QRP is great fun* and very exciting. Many stations were as excited at working a QRP station as I was at working them. Makes for interesting conversation with DX stations as a result; they're impressed and curious. If band conditions are good, propagation favorable, you can work anywhere in the world with only a couple of watts. Just try it. You'll like it!"

Rai Taylor, VK7NRT, was awarded **DXCC QRPp #29** after learning about the program via the newsletter of the VK QRPp Club. Incidentally, we and others in the QRP world were saddened to learn that the VK QRPp Club ceased operation in

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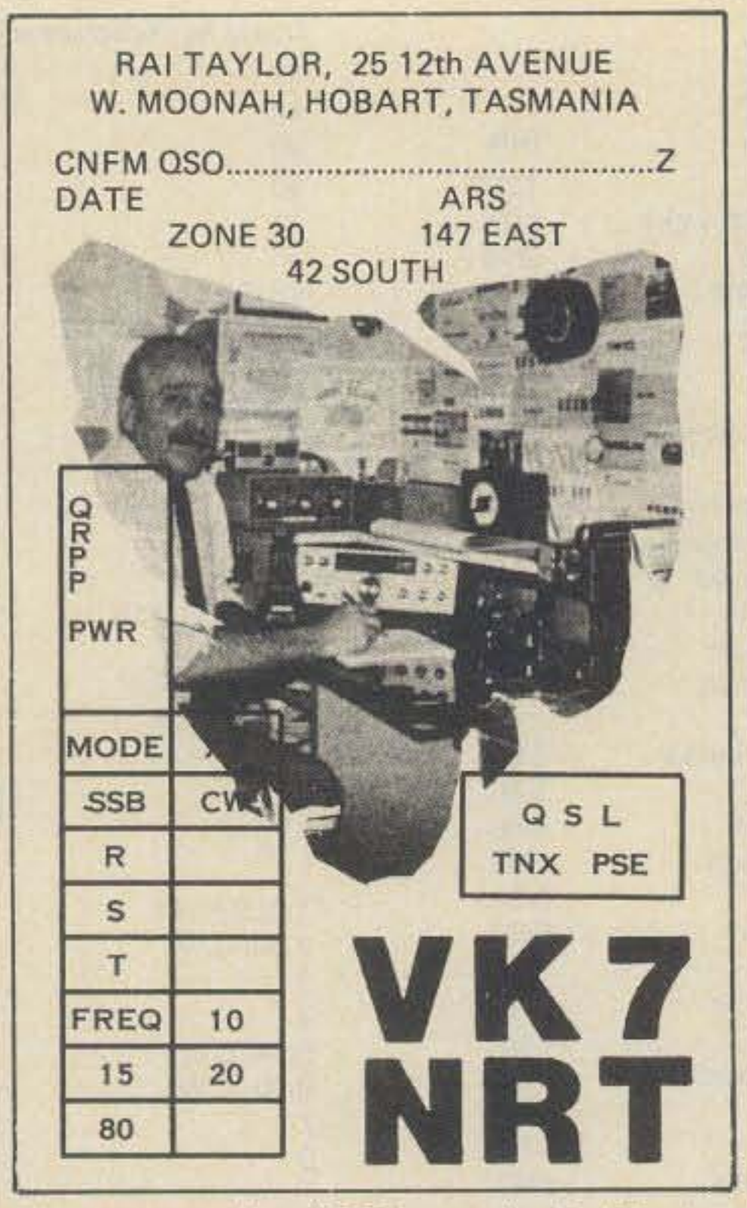

The personalized QSL sent by Rai Taylor, VK7NRT. The central portion of the QSL includes a photo of Rai in front of the Argonaut 509. Some of the QSLs on the wall are from countries that cause a U.S. operator's mouth to water.

1983. We're hoping that someone "down under" will come forward and revive the club, which did a lot to encourage QRPp activity in VK-land. But to return to VK7NRT, Rai gives some insight into the way in which many fellows move into the ranks of QRPp. He writes:

"A short resume of my amateur background may be of interest to readers. I first became interested in radio when in the R.A.F. operating from an R.A.F. Club, GM3HRZ located in the north of Scotland. As a trained wireless operator, it was natural to select amateur radio as a hobby. Unfortunately, I left the service in the 50s and never had the time or inclination to continue with the hobby. But after traveling around the world working in electronics, I finally set down my roots in Australia in 1954. Again, the problems of earning a living, getting married, and raising a family of four children kept me very busy. Then four years ago I lost my wife in a car accident. My children were still quite young (between six and twelve years of age). I am happy to say that during the early part of this dark period amateur radio was a great help in relieving the mental strain. I began to listen to the amateur bands, and much to my surprise I found that my radio operating training of 30 years earlier still held good. Within a few weeks I could copy c.w. as well as ever. So in 1977 I passed the Novice exam and was issued my present call. The decision for QRP involvement became very easy to make when listening one evening to two QRP operators, an SM station and a VK station, both running Argonauts. At that time I had not yet decided on the rig I was going to use. But that particular QSO convinced me that QRP had something to offer, so I bought an Argo 509 and was 'bitten by the bug.'

"True to say, I learned more about antennas from operating QRP. The last few have been homebrewed—quads and Yagis. Most of my DX contacts have been worked on a 6-element Yagi interlaced on 10 and 15 meters. Since attaining my full call in August 1980, I have interlaced the Yagi for 15 and 20 meters and built a 2-element spider quad for 10 meters. I use a single delta loop on 40 and an inverted vee on 80. Power measurements for my Argonaut have been made by the recommended standard two-tone oscilloscope method. I also have a Helray power output indicator. This commercial power meter has been accepted by the VK Postal and Telecommunications (like the U.S. FCC) as being sufficiently accurate for their own stringent requirements. Peak output on all bands except 80 meters is 2.89 watts, with 3.1 watts on 80. C.w. key-down is 1.7 watts on all bands. My d.c. power supply varies from 10.5 to 11.8 volts because of variations in the commercial power sources here.

"It is rather difficult for me to express exactly what I feel about QRP. I am still keenly interested in working QRP. My country total to date is 138 with 109 confirmed. I have the confirmation for WAC for 15 meter c.w. and s.s.b. at present, WAJA, and still need North Dakota for WAS. My new callsign is VK7VV and is great for c.w. operation. But all the countries worked for the DXCC QRPp Trophy were completed before I received the new call. It was both my pleasure and pride to work DXCC QRPp as a Novice! That in itself is rather unusual."

Would You Believe It?

Talk about coincidences! Sometimes I'll get eight pages of a column done, and then work duties call me away for a week or so. I'd gotten to point #4 in Ron Morais's story about a week ago and had to do other things. About three days ago I got a phone call from Ron Moorefield, W8ILC, who was calling to inform me that he had just received the 1 watt s.s.b. QSL for ARRL DXCC country #300! Would you believe it? Three-hundred ARRL DXCC countries with less than 1 watt s.s.b. output! And that doesn't include any easy 'list' QSOs in which the control station relays the QRP operator's call to the DX station. Three-hundred honest and individual countries! *The Milliwatt* DXCC program won't accept such 'list' contacts if the control station passed the QRP call to the DX station.

There is a lot of background involved here, so we'll have to back up a bit. Ron's call could have placed me in a rather em-

barrassing situation, but Ron either forgot about or didn't know about an earlier promise made in regard to the program. Well, too late now, because Ron seems very pleased with just a trophy. Here's the story.

We announced the awarding of DXCC QRPp Trophy #1 to K4OCE back in the June 1972 issue of *The Milliwatt: National Journal of QRPp.* For publicity's sake, *Milliwatt* staffer Karen Thomas agreed to display the trophy in becoming attire. The point of the photo was to attract attention to the award and to motivate guys to try for it. Sandy Blaize, W2GRR, reported in his DXCC story that the photo had just that effect. But here's the punch line. As part of their motivational effort, we commented in the K4OCE announcement: "Although we don't have the final word, Karen has tentatively agreed to a fun-filled weekend, expenses paid, for the first guy to break the 300 country mark with less than 1 watt output—perhaps on some lonely reef." I guess the "lonely reef" part with Karen was to conjure up visions in prospective QRP DXers imaginations of a once-in-a-lifetime opportunity to operate as "rare DX" from some exotic "first time on ever" QTH. Naturally, Karen would be along just to assist in logging duties, etc. I think that was the way it was supposed to work! Correct me if I'm wrong.

Well, just 4 months short of 12 years, Ron Moorefield, W8ILC, has done it! And lucky for me, the "lonely reef with Karen" promise didn't come up. Tough luck, Ron, but all you asked for was the trophy! Sure hope you're satisfied with nothing more than a trophy inscribed **DXCC 300 Milliwatt #1—SSB #1** and "Ronald Moorefield, W8ILC, the first operator in the history of amateur radio to present QSL proof of two-way contacts with amateur stations in 300 ARRL DXCC countries." Super congratulations! Forget about Karen and lonely reefs. They're beside the point!

Plea for Donations

I have another problem I can't figure out at the moment. That is, the problem of financing the DXCC Trophy program. Now I don't want anyone to interpret this paragraph as meaning that the program might be discontinued. It will not. I am totally committed to continuing it for a long time—if not forever. So if you are working toward DXCC QRPp or thinking about it, full steam ahead! There will be a trophy at the other end of your effort. The problem is due to rising costs. The cost of a trophy has risen about 70% in the past 2 years, although the application fee has held at $24 for several years. Up until the rash of applications during 1983, sales of the HW-8 reprint series and application fees kept fairly even with the cost of the program, and I made up the rest. But at this point the outstanding bill left over from 1983 is in excess of $800, and that is a lot! At this point HW-8 reprint sales are dribbling along and certainly won't bring in enough even if a "best-seller" phase occurs. So I'm simply going to appeal to the QRP gang for outright donations. I figure that if enough of the gang sends in a small contribution, numbers will make up the difference, and the financing of the program won't be a burden. So if you've enjoyed reading the DXCC QRPp/Milliwatt columns and would like to support the program, a donation will be greatly appreciated and the QRP cause will benefit. I'll provide a year-end report about donations (won't appear in print until March 1985 or so), and hopefully we'll be smiling!

Well, gang, that's space for this month. We'll continue with more stories in the next column. Propagation on 10 and 15 meters continues to deteriorate as the cycle moves into its low phase, and that makes working DX with QRP more difficult. However, it is no reason to quit. It calls for new strategy, such as using 20 meters at sunrise-sunset periods, finding how propagation has reoriented major paths for you, and trying out the low bands, such as 40 and 30 meters. Yes, 30 meter contacts qualify for the DXCC QRPp/Milliwatt Trophy program. It is unlikely that QRPers will cause any of the type of QRM that has put 30 off-limits for ARRL contests and awards. If the *QRPers Guide* ever gets into print, you'll find a massive amount of propagation material to help in readjusting to low-phase propagation.

73, Ade, W0RSP

The Joy of QRP: Strategy for Success

Ade Weiss, K8EEG/W0RSP, lifetime QRPer and noted QRP author, explains how to devise strategies for successful QRP operation for *your* setup, objectives, and location. Seven detailed chapters cover the following. (1–2) Overview of QRP operation—types, activities, awards, clubs. (3) Complete discussion of the many factors that must be considered in planning for QRP operation with realistic expectations, including selection of objectives, available operating times, location, antenna capabilities, and propagation and band selection. (4) New/used commercial equipment selection with detailed explanation of desirable features, QRO to QRP mods. (5) Homebrewing the first QRP rig, circuit selection tips, parts sources, projects—Viking-5 5 watt 1- or 2-band transmitter for 3.5, 7, 10, and 14 MHz, 1-band v.f.o., 2-band v.f.o., high-current (3 amp) d.c. supply and design theory. (6–7) Exhaustive discussion of general operating techniques, and techniques for specific types/events. The book is 5½" × 8½", approximately 160 pages, with 31 illustrations and project photos. Price is $10.95 postpaid ($11.95 foreign). *The Joy of QRP* is available from Ade Weiss, 83 Suburban Estates, Vermillion, SD 57069. Valuable for Novices, newcomers, and QRP veterans alike.

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Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The story of the month as told by Mike is:

Michael E. Gilmore, K7CLO
All Counties #197, 10-10-78

"I think it is about time for me to send in a few words about myself and some pictures. I am part American Indian (Cherokee) and am extremely interested in anything to do with Indians. I am an avid collector of artifacts, am an arrowhead hunter, and have quite an extensive collection of Indian artifacts. I was made a 'grandfather' two years ago.

"The 'second operator' shown in the picture is a hand-carved Indian I picked up at a local swapmeet. He is about six feet tall and was carved by a man called Jim Whiteeagle. I am in the process of making his clothing of buckskin with a full headdress and all the other things to make him look authentic.

"We still have four children living at home, three girls and one boy. Our oldest daughter is married. I work on navagational computers for F-4 aircraft at Hill Air Force Base, about five miles north of my QTH in Layton, Utah.

"Our family has many hobbies. My wife collects dolls and paints Indian portraits. She has tried to paint other subjects, but all her best paintings are of Indians. We regularly go arrowhead hunting, and after the bad winter we had, we are again enjoying that hobby. I also carve wooden Hopi Indian Kachina dolls. I guess I have carved over a thousand dolls, but I don't do much carving anymore unless I have a special request.

"I stumbled onto the County Hunters Net one night when Bud, W7SUY (now N7SU), was Net Control. Of course I had no idea what was going on. Bud explained what the Net was all about. I couldn't believe that a group of people was trying to confirm contacts with all the counties in the United States!

"Larry, WB7AYN, explained more about the net to me and I became a regular participant. I now have All Counties #197, 10-10-78, #16 second time around, and have almost finished the third time around.

"You can't work with a finer bunch of radio amateurs than you will find on the County Hunters Net. There are many people I should thank for the help and support they offered me. I know I will miss some if I list them, but at the top of the list must be Bud, N7SU, and Larry, WB7AYN.

"I obtained my license in 1958, and I think it was probably one of the best moves I have made. I haven't been on the air much recently because we acquired a metal detector and bought a CJ-8 Scrambler Jeep Pickup for arrowhead hunting. Right now ham radio takes a second place. No matter how busy we are, though, we will always have time to listen regularly to hear our friends on the CHN.

"Let me again thank N7SU, WB7AYN, WB2SLV, WB5NFS, K5RPC, W5LXG, WA6MAR, W0SJE, and WA7FGU, and so many others. I will be looking forward to working with you again in the future—73, Mike, K7CLO."

(Note: Mike was voted NCS of the year by ICHN members in 1978. The "Second Time Around" Award is sponsored by MARAC, and the "Third Time Around" award is sponsored by the Mobile QSL Bureau in Lakeside, CA.)

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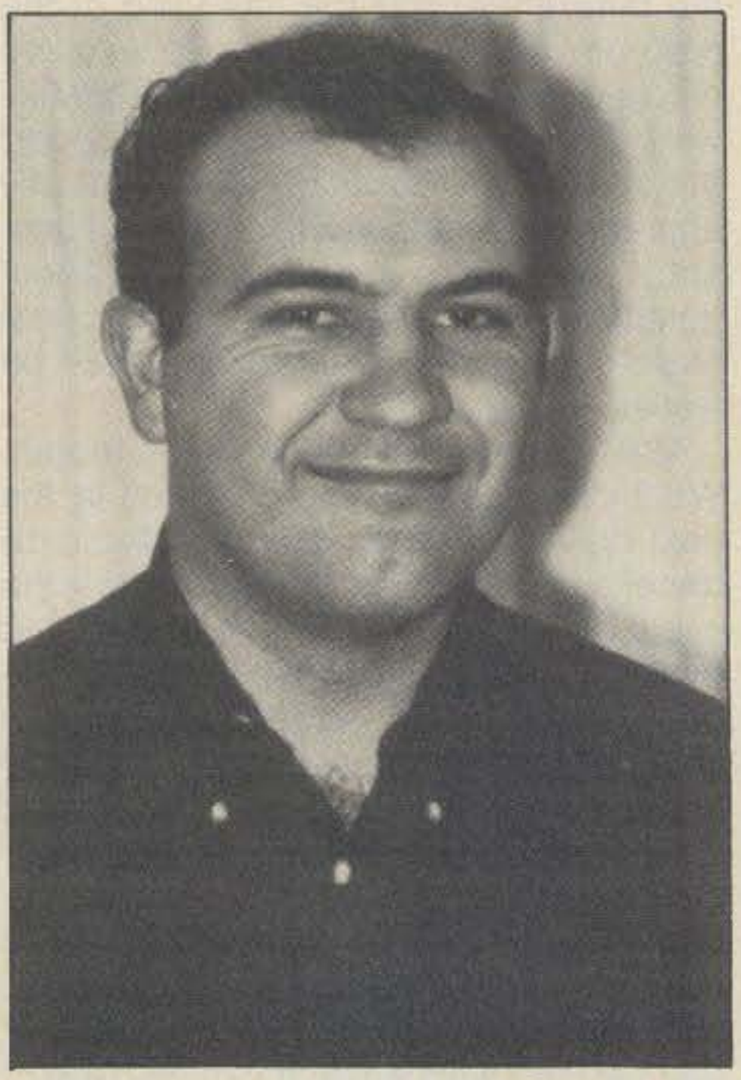

Mike Gilmore, K7CLO, All Counties #197, 10-10-84.

"Second Operator" is a hand-carved wooden Indian shown in shack of Mike, K7CLO.

QTH of Mike, K7CLO, in Layton, Utah.

Special Honor Roll
All Counties
#468 Jim Thomas, KB4XK 3-10-84
#469 Bernie Maier, WB3DWH 3-21-84
#470 Kyle P. Chavis, WA4PGM 3-31-84

Awards Issued

Jim Thomas, KB4XK, finished them all and sent in his application just in time to receive the Award for All Counties #468, 3-10-84, Mixed, at the Texas Mini in Longview, Texas.

Bernie Maier, WB3DWH, worked all the counties s.s.b. with mobile stations and qualified for All Counties #469, 3-21-84.

Kyle P. Chavis, WA4PGM, completed all the paperwork and sent for All Counties #470, 3-31-84, Mixed.

Ed Sanders, WA6VJP, continues to upgrade his USA-CA certificate and has now added the seal for 2500, All C.W.

USA-CA 500 Awards were issued to:

Jim Thomas, KB4XK, #1928, 3-10-84, All 20 Meter Mobile, S.S.B.

Doug Allerston, G5PQ, #1929, 3-11-83, Mixed.

Yoshiichi "Yoshi" Higuchi, JA1EF, #1930, 3-12-84, Mixed.

Hans Gerner, DL7HT, #1931, 3-21-84, All C.W.

Frank Lambert, WB4OUF, #1932, 3-21-84, All 20 Meter S.S.B.

Joel C. Dennis, KS3F, #1934, 3-29-84, All C.W. Joel worked his first 500 counties all on the Novice subbands.

Kyle P. Chavis, WA4PGM, #1935, 3-31-84, Mixed.

New Awards

CWP Award. CWP is a group of amateurs in Petropolis, RJ Brazil (the historic Imperial City, near Rio de Janeiro) who promote DX/c.w. activities. The CWP Award may be obtained in three different

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		KB4XK	679	DL7HT	1931
2500		WB3DWH	680	WB4OUF	1932
KB4XK	556	WA4PGM	681	WB3DWH	1933
WB3DWH	557			KS3F	1934
WA6VJP	558	**1000**		WA4PGM	1935
WA4PGM	559	KB4XK	832		
		WB3DWH	833		
2000		WA4PGM	834		
KB3XK	610				

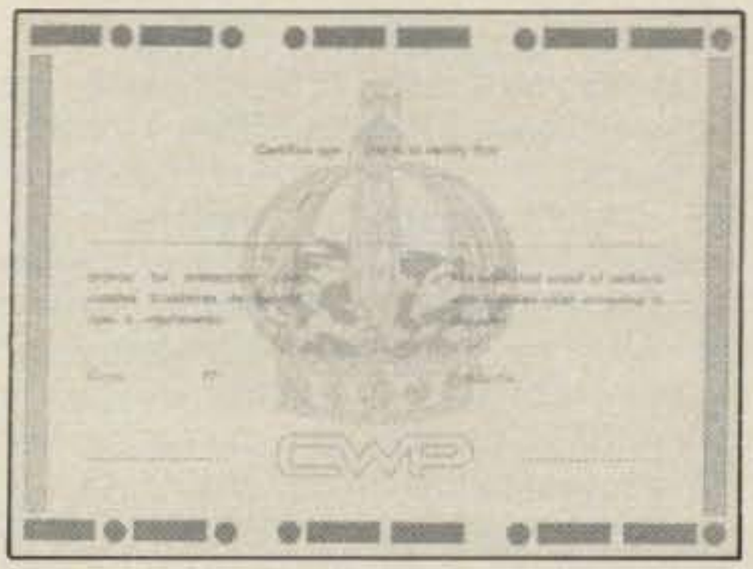
classes, only c.w. mode, contacts after December 1, 1983.

Class I: Work 10 Brazilian cities plus 2 contacts with CWP members or delegates.

Class II: Work 10 Brazilian cities plus 4 contacts with CWP members or delegates.

Class III: Work 30 Brazilian cities plus 6 contacts with CWP members or delegates.

One CWP member or delegate may be used to log more than once, only if worked on different dates or bands. S.w.l. same rules as above.



CWP Award from Petropolis, Brazil.

CWP Members: KA9KUH; PP2ADY; PT2ACZ, GK; PT7WA; PY1AFA, APS, AYE, AZG, BPR, BVY, CC, DFF, DK, DMX, DRW, DWM, DYO, EBK, EBN, ECL, EWN, JF, KT, MIT, OB, PL, ON, QQ, RD, TBW, TG, UBS, URO, UTZ, UUW, UWI, VEC, VMV, WXU, YOC, YOV, ZFF; PY2AC, IL, KQ, MC, MT, ORW, RLQ, RRG; PY3CJI, MQ; PY6AMJ.

No QSL, only GCR. Fee 7 IRCs. Send application and fee to P.O. Box 90415, 25600 - Petropolis, RJ, Brazil. U.S.A. stations only may send applications via Harv Nelson, KA9KUH/PY1ZFF, P.O. Box 736, Stevens Point, WI 54481.

Ontario Bicentennial Award. Sponsored by The Radio Society of Ontario, Inc. Contacts valid only for January 1 to December 31, 1984.

VE3 Stations: Contact 200 different VE3 or portable VE3 stations. One point each.

Other VE, VO, VY Stations: Contact 100 different VE3 or portable VE3 stations. Two points each.

DX Stations Including U.S.A.: Contact 20 different VE3 or portable VE3 stations. Ten points each.

Ontario Bicentennial Award sponsored by the Radio Society of Ontario, Canada.

Any mode, band endorsed at your wish. Special seals for each 200 extra points. If VE3 stations are using special calls or prefixes, they count double.

No QSL cards necessary. Send certified log data and $1.00 or 3 IRCs to VE3LSS, Bicentennial Project, Listowel District Secondary School, Geography Department, Listowel, Ontario, Canada N4W 2M4. *(Note: This is a multi-colored parchment certificate. Thanks to Garry, VE3GCO, for this information.)*

The Bird of Paradise Award from Papua, New Guinea.

Outline map of Papua, New Guinea.

The Bird of Paradise Award. This award is issued by the Papua New Guinea Amateur Radio Society. The purpose of the award is to encourage contacts with amateurs in the independent state of Papua New Guinea, to advance the art of radio communications, and to help foster international friendship and goodwill. Rules and conditions are as follows.

1. The award is open to amateurs throughout the world. However, for the purpose of the award, two geographical

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areas are considered. The following are the minimum requirements:

(a) Oceania (IARU zones 27, 28, 29, 30, 31, and 32)—The applicant must contact at least 7 of the licensed amateur stations in P29, with at least 5 of them located in different provinces. (It is advisable to ask the province as well as the QTH.)

(b) All other areas—The applicant must contact at least 5 licensed amateur stations in P29, with at least 3 of them located in different provinces.

2. The National Capitol District (Port Moresby) is a separate province.

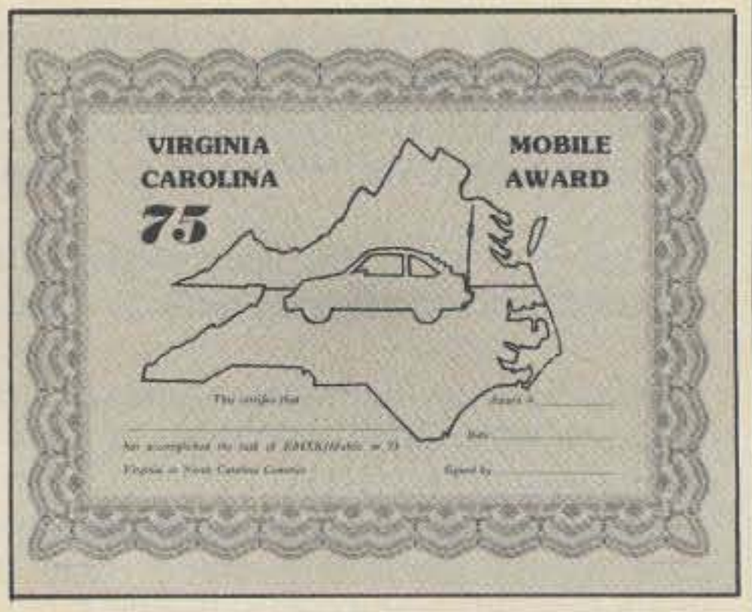
3. The Official Society Station P29PNG, which is only activated on special occasions, may be substituted for any province.

4. Only contacts made after Independence (16 September 1975) will be accepted.

5. Any band and mode may be used. Special endorsements will be made for one band, one mode, etc., if specifically requested.

6. Certified log entries signed by two fellow amateurs must accompany the application. QSL cards are not required.

7. The application should be accompanied by: Australian $3.00 or U.S. $3.00 (or equivalent) to offset high printing and postal costs. (Please do not send cheques or postal notes.)



The Virginia-Carolina Mobile Award.

The Virginia-Carolina 75 Mobile Award. The object is to work KB4XK/M in any Virginia or North Carolina counties until a total of 75 different counties is reached. Any combination of counties is possible, as long as the total is 75. There are no band or mode restrictions. The only requirement is that all contacts are to be made with KB4XK/M. No QSLs are necessary. Contacts with the old call, WD4HXX, are also good. Contacts before May 27, 1978 and repeater contacts are not good. The award is available to s.w.l.'s on a heard basis.

Send only log data. The award is free. Send application to Jim Thomas, KB4XK, P.O. Box 153, Milton, NC 27305.

Notes

From NØCLV: The Mobile Amateur Radio Awards Club (MARAC) would like to invite all interested amateurs to the annual convention to be held Wednesday, July 4, through July 7 at the Holiday Inn in Overland Park, Kansas. There will be a picnic for early arrivals on Wednesday evening. Area tours and dinner theater will be on Thursday, followed by antenna and computer forums on Friday. The annual business meeting will be held on Saturday morning. A hospitality suite will be open during the entire convention. For more information, contact R. L. Dyson, KØAYO, Rt. 1, Box 230 M, De Soto, KS 66018 (s.a.s.e.).

At least another summer holiday season has arrived. It was a long, stormy winter in most parts of the northern hemisphere, and we are ready to spend some time in the sunshine. I hope everything is going well where you are.

73, Dorothy, WB9RCY

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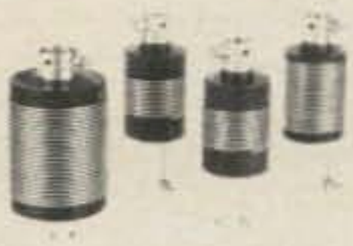

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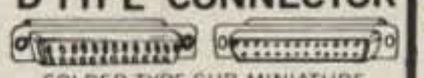

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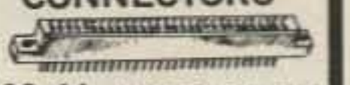

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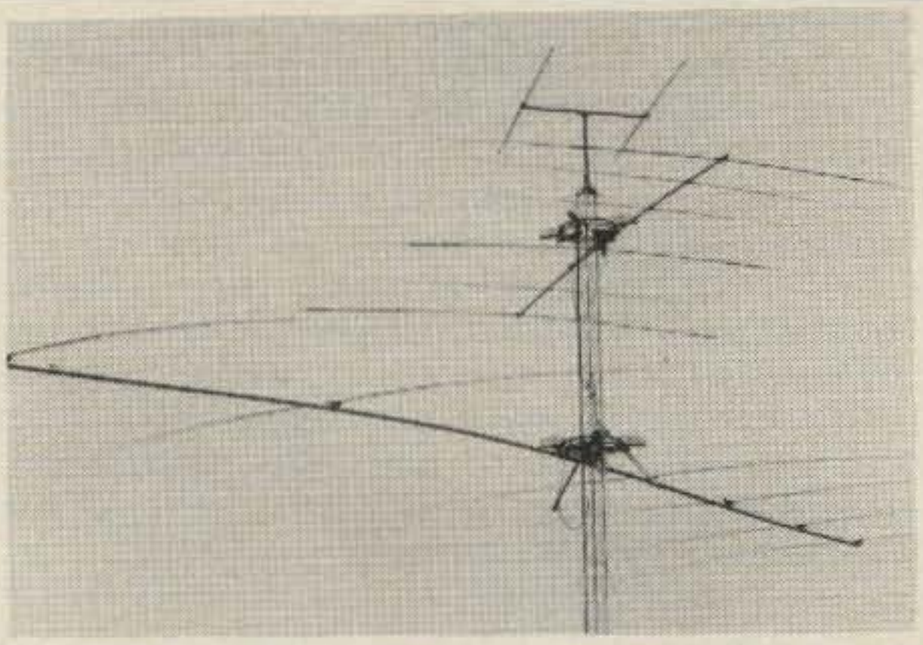

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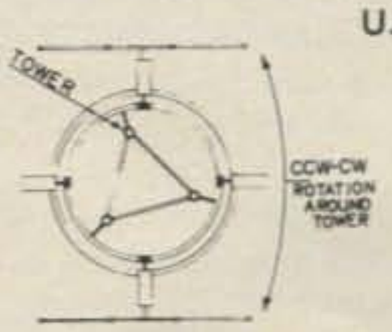

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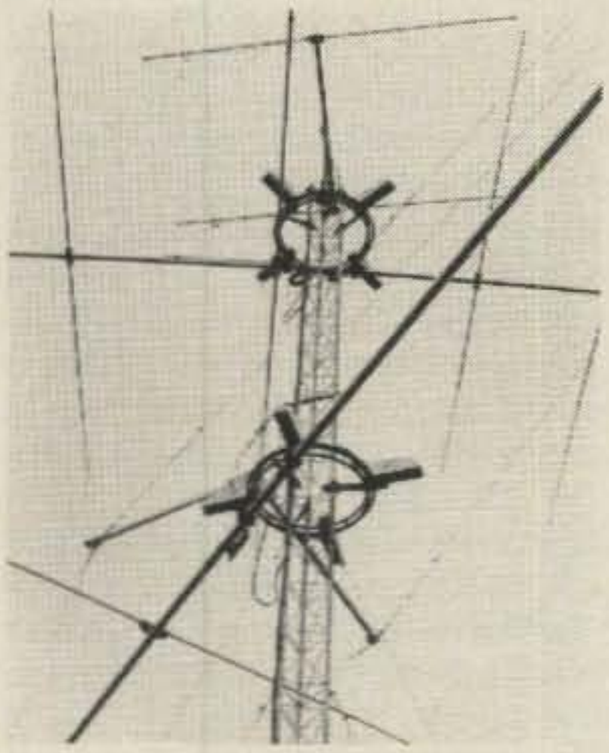

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World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Joining Today's SSTV Action

As you'll recall, last month's column featured a semi-technical guide to today's world of slow scan TV: the mode's many attractions, its on-the-air activities, the new gear, and a look at color SSTV. This month we're continuing that video pursuit with a "straight talk" discussion of how you can join this fascinating amateur activity in a successful manner. If these two columns seem like an above-average drive for inspiring your video interest, well, you're probably right. Although we can't project ourselves in front of your receiver's dial, and wave visual samples when you tune past our activities, we're sure that once exposed to SSTV you'll be moved to join the fun. Hopefully, I've piqued your curiosity sufficiently so that you'll investigate SSTV at some local dealer's showroom or visit a nearby slow scanner during a time of action. Following that exposure, you'll surely have a flurry of questions. Here's hoping this month's column answers most of those inquiries.

There are a number of levels and techniques for getting started in SSTV activity. A hamfest/fleamarket-acquired monitor will allow you to "look in" on today's action, for example, and an audio cassette recorder can be used for taping the more interesting views. A nearby slow scanner or someone using a camera "live" on-the-air would probably be glad to tape a few station IDs, which you could use for transmissions until you locate your own camera or scan converter system.

One of the more attractive ways of getting fully started in SSTV centers around using an older Robot Model 400 scan converter, Fast Scan monitor, and camera. Those units are beginning to appear on the used market at quite attractive prices, and full-color conversions are available from Interface Systems or Robot Research. Let's assume you've managed to proceed in that direction and briefly consider some video-related points of interest. Since all presently available SSTV scan converters interconnect similarly with one's s.s.b. setup, a general station layout is exemplified in fig. 1. The scan converter's input is connected to the transceiver's speaker or phone-patch output for receiving SSTV, and the scan converter's output is connected to the transceiver's mike or phone-patch input for transmitting SSTV. If the patch input is used, "automatic transmit" while using taped programs and VOX operation are possible. Remember to disable your mike during SSTV transmissions, however, or in-shack noises will interfere with outgoing pictures. If your transceiver features an s.s.b. monitor circuit, it can also be used for checking SSTV views as they are transmitted.

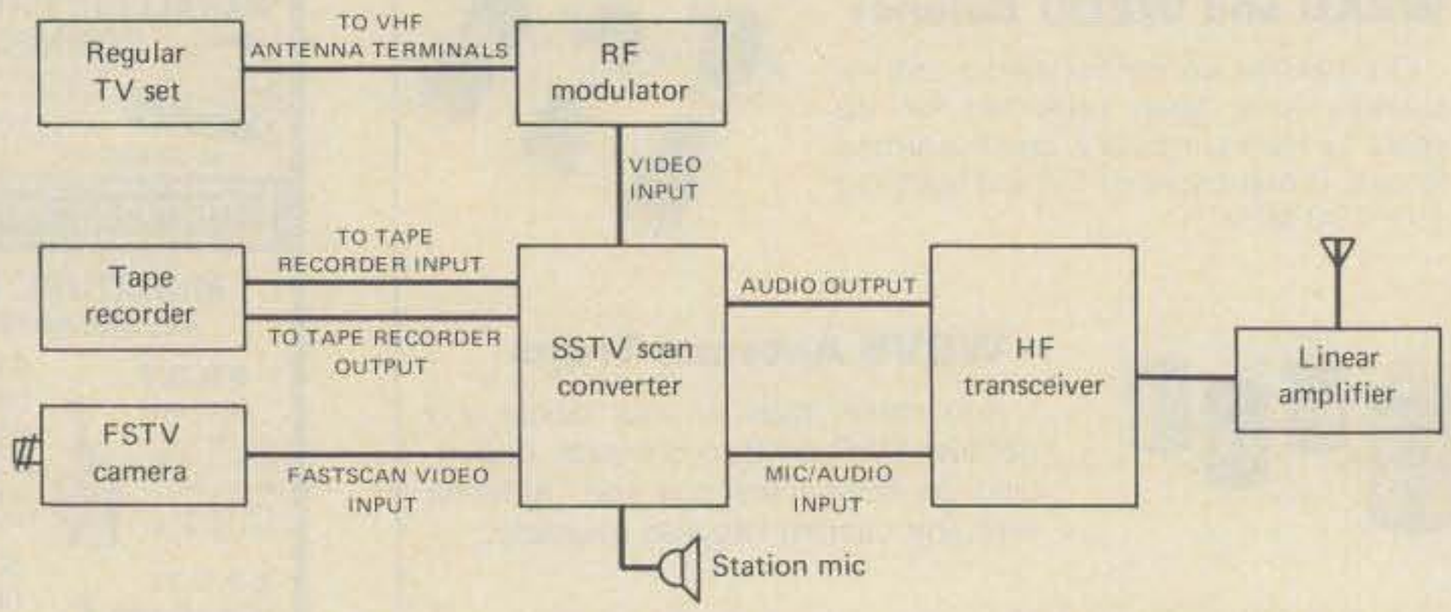

Fig. 1– Basic interconnections for an SSTV setup using a digital scan converter, cassette tape recorder, and fast-scan video gear. Microphone may "normal through" scan converter, or SSTV may be directed to the transceiver's phone-patch input. R.f. modulator is used when a regular home TV is employed for SSTV displays.

Peripheral equipment connected to the scan converter consists of a fast-scan monitor or regular TV receiver (an optional r.f. modulator is used between the scan converter and the TV's antenna terminals), a fast-scan TV camera (inexpensive home video black-and-white or color units are quite sufficient), and an audio cassette tape recorder (frequency response isn't critical, but good speed regulation is necessary for smooth sync pulse retention). Assuming a few cables are quick-assembled, one thus may become SSTV-active in roughly an hour's time. However, we do suggest monitoring/studying on-the-air activity for a period before transmitting your own pictures. Acquired knowledge then will let your pictures blend in the SSTV world rather than appear as a newcomer.

Once you've become operational with basic SSTV, your next move probably will be the inclusion of color. Fortunately, that move isn't as difficult as it sounds. A color SSTV retrofit kit can be installed in a Robot 400 during an evening's time, and a color monitor or TV set easily replaces its black-and-white counterpart. Since SSTV is a slow-moving concept (no pun intended!), a homebrew red, green, and blue color wheel can be used in front of a black-and-white camera for color operations. Each memory's input button is merely pushed when the appropriate color filter is in front of the camera's lens. Now who said color SSTV was exceptionally complex?

Setting Up The SSTV Station

While SSTV gear can be interconnected for on-the-air use within a few minutes' time, setting up various items for smooth operations often requires a few evenings' planning to perfect the new layout. R.f. feedback in the monitor or tape recorder may rear its ugly head, but running a large and *independent* ground strap between various units usually works wonders. In other words, never rely solely on cable shields for grounding.

When laying out your SSTV gear, bear in mind that scan converter controls should be easily accessible from the operating position, and the monitor should not be placed so close that you can see individual picture elements. This isn't RTTY; we are not reading the screen, but rather are viewing pictures. Two or three feet of eye-to-screen spacing is a good starting distance for a five inch screen, and five or six foot spacing is suggested for a ten inch screen. An extra cooling fan placed to move air across the station's transceiver and amplifier is also suggested. I personally use a small whisper fan sitting horizontally on the desk's rear; its cooling affects power supply, final heat sinks, and the linear's rear panel (see fig. 2).

An especially useful accessory for televising pictures in a dim room is a 35 mm slide projector and wall-mounted retractable screen. The station's camera can be trained on projected views, and

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Say You Saw It In CQ

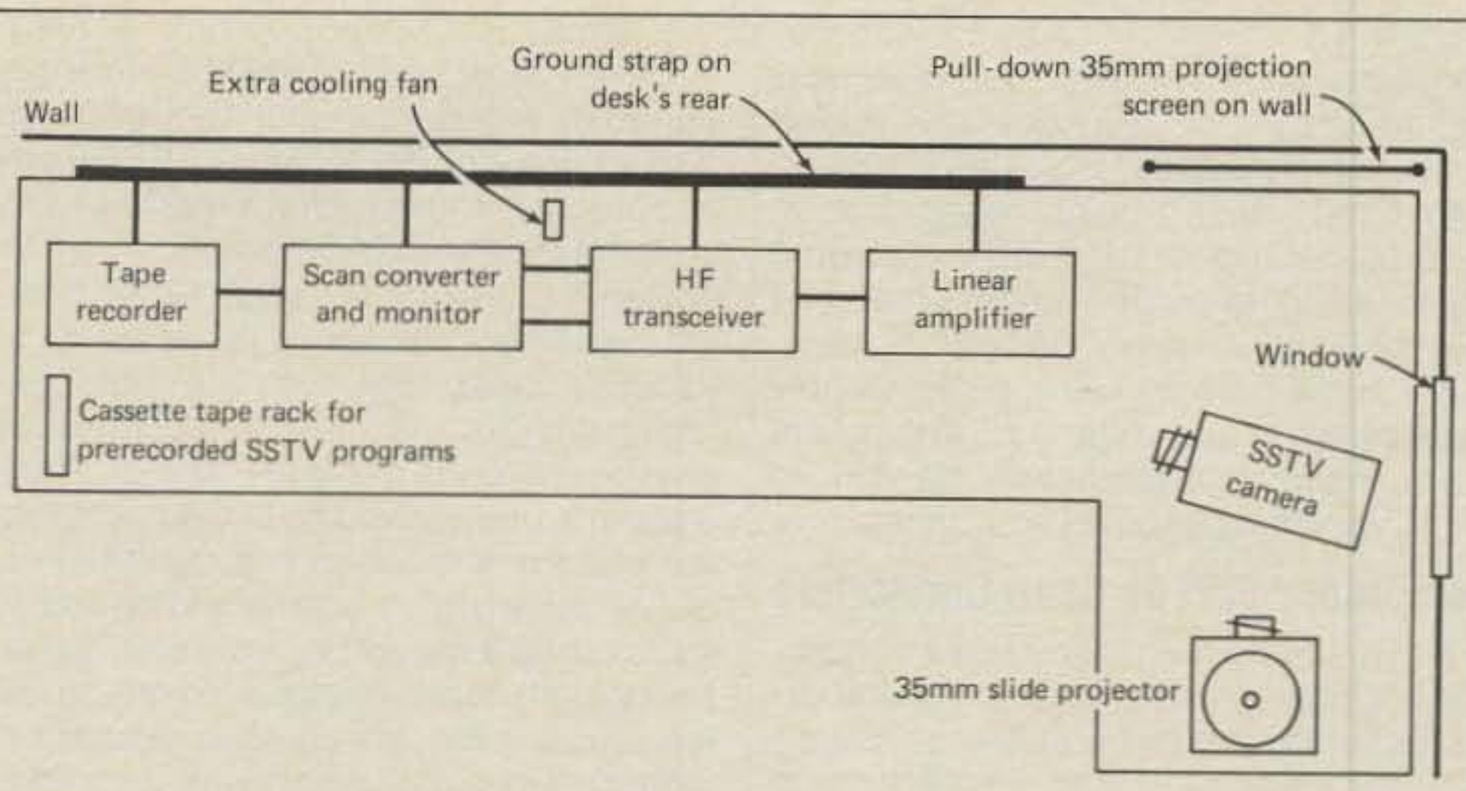

Fig. 2–Typical layout for an effective and easy-to-use SSTV setup. Note smooth accessibility to scan converter's controls, tape recorder, cassette rack, and slide-projector screen. Camera may view operating position, wall screen, or antenna view from window. Monitor may be placed atop scan converter or on a table beside the desk, depending on screen size.

reflected light provides easy viewing. Assuming one builds a slide collection of vacation travels and local attractions, each set can be recorded on separate audio cassettes for later recall and use. The cassettes can be end-labeled for contents, and then loaded into a carousel or wall rack placed within arm's reach of the operating position. A wide variety of SSTV programs then are ready for tape playback when desired.

Camera Notes

Newcomers to the video camera game can find a wealth of useful information in photographic books and magazines sold throughout the land. There are full descriptions, for example, of lens differences, depths of field, back lighting and bounced light, plus picture composing and color-balancing ideas. Likewise, many of the special-effects lenses and adapters used with photographic cameras can be operated to advantage with video cameras. There are multiple-image lenses, graded color filters, starburst adapters, and many more accessories which merely snap onto the camera's lens. Producing some clever SSTV pictures with these items could easily make you a star feature on the bands.

Although acceptable SSTV results can be achieved using reduced lighting—a couple of 75 watt bulbs in reflectors—we heartily suggest using twice that amount and including back or bounced light. Resultant views have a superb clarity and great depth of field. We also suggest using quartz light rather than incandescent especially if you are operating color. Quartz lighting is pure: not red/orange or blue/green in nature (and camera pickup tubes "see" differently than our eyes). Finally, remember to leave your off-the-air SSTV monitor properly adjusted when setting up the SSTV camera. Those two units can otherwise produce acceptable in-shack views which lack sufficient contrast/frequency swing for smooth off-the-air viewing.

Operating SSTV

As previously mentioned, we suggest briefly monitoring SSTV transmissions from others to get a feel for the mode's operation. If you experience minor prob-

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CIRCLE 78 ON READER SERVICE CARD

lems tuning SSTV signals, try running for the most natural s.s.b. voices and then adjust only the scan converter/monitor when those stations begin transmitting pictures. The Timekit Blinky reviewed in November 1983 *CQ* also makes an ideal SSTV-tuning/camera-adjusting aid. Remember to explain complex views before transmission, and if you are using color, let your format and frame sequence be known to others. This is often heard on the air in a manner such as "red, green, blue, two, two, and two." It means the first two 8-second frames are red and black, the next two are green and black, etc. Receiving SSTVers follow suit in memory loading their scan converters.

SSTV is a 100-percent duty-cycle mode. Consequently, r.f. power output should be reduced to *at least* one half during video transmissions. This level adjustment is included on the rear panel of scan coverters and dedicated SSTV cameras. Personally, I've always run *less* than half my available r.f. output on SSTV. The results of cool-running finals, power-supply transformers, and antenna traps meant fewer repairs and replacements. A word to the wise thus should be sufficient.

Computers Versus Scan Converters

As mentioned in last month's column, it is possible to use a couple of the popular home computers for SSTV operations. This isn't an RTTY-type commercial area, however. Most of the systems were designed by active slow scanners who also own an Apple or Radio Shack TRS-80 color computer (no, I haven't heard of any systems for Atari, Commodore, TI, or older Radio Shack computers). Some present systems provide only receive or transmit capabilities. Some of the interfacing circuits and interconnections may also be left to the computer owner. Thus, a general understanding of video and digital electronic concepts is quite beneficial. In other words, you should be able to visualize how the SSTV "front end" (interfacing unit) converts tones to voltage levels, strips sync, establishes equivalent digital counts, etc., and how the computer buffers and clocks that data to provide scan conversions.

Most SSTV-interfaced home-computer setups have thus far provided slightly compromising results in picture reception and displayed resolution. This is because most "front ends" used with computers are basic in design, lacking QRM and QRN immunity. Dedicated scan converters usually perform better under less than optimum signal conditions. Although an SSTV picture may be stored/processed in as little as 16K of Random Access Memory (RAM), picture elements must be compacted. That necessarily reduces overall picture definition. All aspects considered, a TRS-80C or Apple II computer is acceptable for most casual SSTV operations, but serious scanners would probably prefer a dedicated scan converter unit. However, if you presently own an Apple or color computer, it's a logical way to get started in SSTV.

That's the general view as seen from this end, gang, and we sincerely hope you've been inspired to try slow-scan TV. It's a fascinating area of communications that truly can add new life to your amateur activities. As we've said many times, the original Golden Age of Radio is very much alive and thriving. It lives within today's specialized communications frontiers: SSTV, OSCAR, EME, etc.

New SSTV Book

During the last few years there has been a noticeable vacancy in up-to-date SSTV information for newcomers and semitechnical operators. I'm proud to report that that void will soon be filled with my new book *Introduction to SSTV*, which is being published by Universal Electronics, 4555 Groves Road, Suite 3, Columbus, OH 43227. The book is formatted in an understandable manner and thus should be useful to both oldtimers and newcomers alike. Many of you have asked for a less technical version of my *Complete Handbook of SSTV* (TAB #859). That was the driving force which inspired writing this new SSTV book. Printed copies should be available during the next 30 to 60 days.

73, Dave, K4TWJ

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11056	28	5.15	4.50	4.05
11057	40	6.81	5.95	5.35
11058	64	12.02	10.50	9.45

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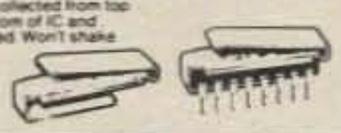
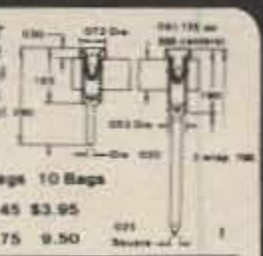


SCREW MACHINED SOCKET PINS, loose, packaged in bags of 100. Stock No. 11310 is solder tail with gold collet tin shell. Stock No. 11311 is wire wrap with gold collet gold shell.



Stock No	Description	1 Bag	5 Bags	10 Bags
11310	Bag of 100 solder tail pins	$ 4.95	$ 4.45	$3.95
11311	Bag of 100 wire wrap pins	11.95	10.75	9.50

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Stock No.	1-9	10 & Up
12098	$1.42	$1.28

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Stock No	Dia	Length (feet)	Weight (oz.)	Price
50075	062	9	1.5	$1.16
50076	062	25	4	2.39
50077	062	50	8	4.25
50078	032	33	1.5	1.31
50079	032	88.5	4	2.47
50080	032	175	8	4.57

TI WIRE WRAP SOCKETS

Tin plated phosphor bronze contact – 3 wrap

Stock No.	No Pins	1-99	100-499	500
11301	8	$.40	$.36	$.30
11302	14	.59	.54	.45
11303	16	.64	.58	.48
11304	18	.73	.66	.55
11305	20	.99	.90	.75
11306	22	1.12	1.02	.85
11307	24	1.25	1.14	.95
11308	28	1.52	1.38	1.15
11309	40	2.05	1.86	1.55

TI LOW PROFILE SOCKETS

Tin plated copper alloy 688 contact pins with gas tight seal.

Stock No.	No Pins	1-24	25-99	100-999
11201	8	$.10	$.09	$.08
11202	14	.14	.13	.12
11203	16	.16	.15	.14
11204	18	.18	.17	.15
11205	20	.20	.18	.16
11206	22	.22	.20	.18
11207	24	.24	.22	.20
11208	28	.28	.26	.25
11209	40	.40	.37	.33

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03305	24	43.20	36.72	30.24
03308	40	71.98	61.18	50.34
03309	50	89.98	76.48	62.99
#28 AWG Stranded Flat Cable ("GREY" cable)				
03313	14	$ 28.68	$ 24.38	$ 20.08
03315	16	32.78	27.86	22.95
03317	24	49.16	41.79	34.41
03323	40	81.94	69.65	57.36
03324	50	102.42	87.06	71.69
#28 AWG Stranded Color-Coded Cable				
03330	14	$ 43.94	$ 37.35	$ 30.76
03332	16	50.24	42.70	35.17
03334	24	75.32	64.02	52.72
03340	40	125.53	106.68	87.86
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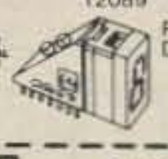
Stock No.	Color	1	100
12082	Red	$1.12	$ .99
12085	Green	1.84	1.63
12087	Yellow	1.92	1.70
12089	Orange	2.08	1.84

Right Angle Socket for Above Displays



Stock No	1	100
11010	$1.24	$ .99

OPTEL LCD's with pins

Stock No. 47005

Stock No. 47006

Stock No. 47007

Stock No	Description	1	10
47005	3½ dig, .5"	$ 5.95	$ 5.50
47006	4 dig, .5"	5.95	5.50
47007	4 dig, .7"	11.90	11.00

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New battery powered tool wraps insulated wire around .025" square posts without need for pre-cutting and pre-stripping. Complete with bit and 100 ft. 30 AWG wire.

Stock No.	Description	Price
13340	Battery just-wrap tool with bit and 100 ft. 30 AWG wire	$59.95
13341	Replacement bit	10.35
13342	100 ft. blue replacement wire	7.54
13343	100 ft. white replacement wire	7.54
13344	100 ft. yellow replacement wire	7.54
13345	100 ft. red replacement wire	7.54

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Stock No.	Reference	Price
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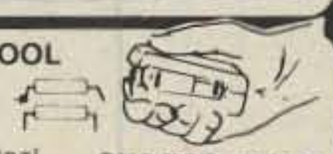
23011	8080A/8085A	5.95
23012	6502 (65XX)	5.95
23013	8048 and relatives	5.95
23014	54/7400 TTL Pinouts	5.95
23015	Basic Algorithms	5.95

PIN FORMING TOOL

puts IC's on their true row to row spacing. One side is for .300 centers, Flip tool over for devices .600 centers. Put device in tool and squeeze.



ONE TOOL DOES 8 thru 40 PINS!

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03511	Basic board, 4.5 x 5.5	19.50
03506	Intel SBC-8010 Board, 12 x 6.75	64.95
03507	Motorola M-6800 Board, 9.75 x 6	42.95
03508	S-100 Board, 10 x 5.3	36.95
03509	Z-80 Board, 7.7 x 7.5	39.95
03510	Eurocard Board, 6.3 x 3.9	21.95

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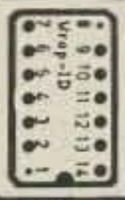

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13296	16 pin
13297	18 pin
13298	20 pin
13299	22 pin
13300	24 pin
13301	28 pin
13302	40 pin
13303	96 pin

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10353	5	1.45	1.30
10354	6	1.50	1.40
10355	7	1.60	1.45
10356	8	1.85	1.65
10357	9	2.10	1.95
19358	10	2.25	2.05

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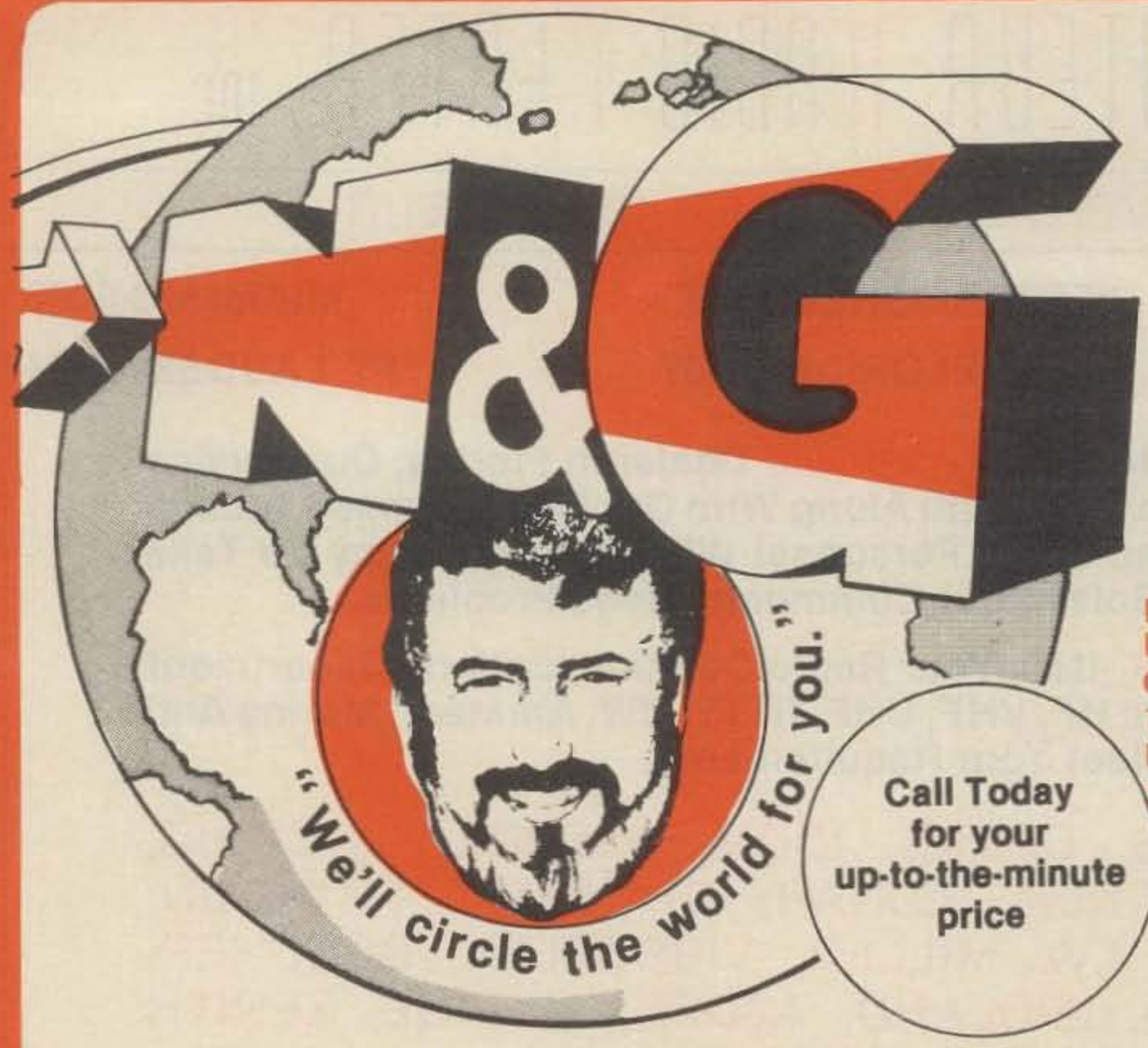

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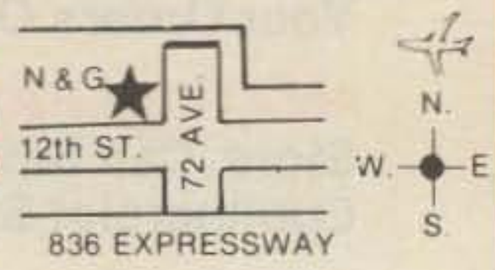

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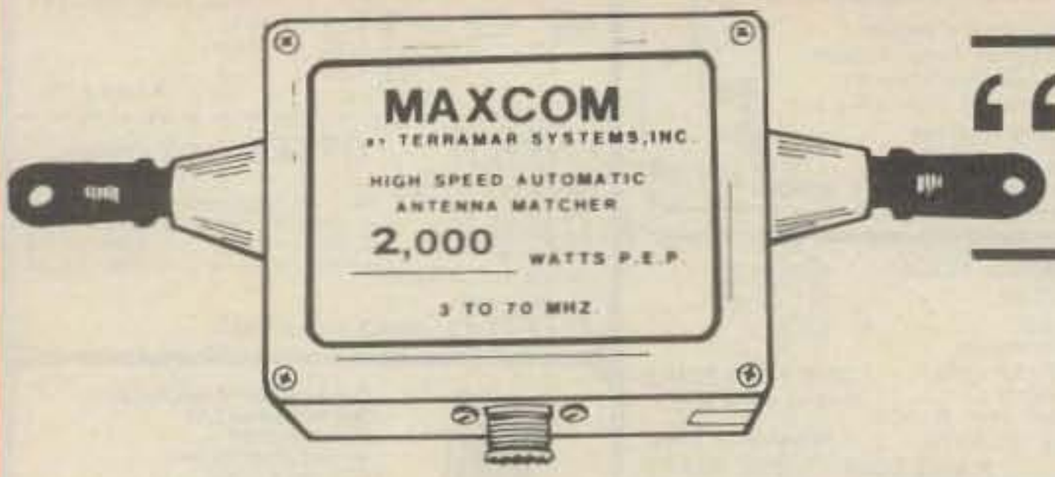

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CIRCLE 33 ON READER SERVICE CARD

Antennas

a monthly feature by
KARL T. THURBER, JR., W8FX

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

Reader Recap

This month in CQ author W8FX opens the mailbag for a recap of column correspondence received over the past few months, and he also introduces several new topics you should find interesting.

In last month's Antennas column we completed our two-part review of the first four years of the column under our stewardship. In the first installment we highlighted the first two years, 1980–81, while in the second we covered 1982–83. Last month we also touched on some reader correspondence, discussed several software topics, and focused on the imported "DX Penetrator" h.f. beam antennas.

This month it's catch-up time for a forum constituting reader mail received in recent months. We'll also take note of some interesting 1750 meter topics and discuss some new amateur computer software. Let's open this month's column by first digging into the mailbag.

Reader Recap

A pleasant letter from Old Timer Allen H. Johnston, W4FII, recalled the good old days of radio in response to our coverage of the venerable Cage antenna design in the October 1983 column. Wrote Allen:

"Today I mailed a card to David Johnson, W2BN, about the antenna *(Dave commercially manufactures Cage antennas for the amateur community—ed).* Exactly 60 years ago this month my Cage antenna was my pride and joy. Yes, it worked and was of the inverted-L type. This sure brings back many memories. The antenna was mounted at about 50 feet or so using six or eight wires (not sure). Believe me, it was an eye-catcher!"

"Another type of antenna called the 'Magnet' was used during the Twenties. I do not remember the exact information, but it was about 60 feet long and very heavy. At that time it loaded up well on 40 meters and higher frequencies. At today's costs, the magnets would cost two or three hundred dollars . . . Gernsback *(the late Harvey Gernsback, inventor and publisher—ed.)* had some information on the antenna . . ."

On a different subject, we had conducted extensive correspondence with Gerson Risson, PY1APS, regarding a seemingly insoluble TVI problem. Gerson's longtime TVI on Rio de Janeiro's Channel 4 from his 20 meter DX operations threatened his amateur radio hobby despite the application of a wide range of TVI-suppression measures. The long-running saga has a happy ending, however, as noted in two followup letters we received from PY1APS. We'll quote from both here:

"I just received the November issue of *CQ*, and I want to thank you very much for the article about my TVI problem. As I wrote you before, I delayed a few months to answer your letter with suggestions (because of illness). When I returned, I had the bad surprise learning of the establishment of Channel 6 in Rio. After that the problem became worse. My strong TVI on Channel 4, while on 20 meters (c.w.), was extended also to Channel 6 while on 20, 15, or 10 meter c.w.

"Remember also that I live in a condominium with 43 apartments and with only a common antenna system, so my TVI was terrible in all 43 apartments. I tried almost all your suggestions, but in vain. I used five more lowpass filters and also moved them to all possible positions. *(See the complex block wiring diagram of the PY1APS station in the November column—ed.).*

"I also added one more a.c. line filter and moved the TV antennas which were within about 8 feet of my tower to about 82 feet distant, but also in vain. When I moved the TV antennas, the TVI from 20 meters on Channel 4 decreased, but on Channel 6 it remained the same. Even using but one watt, I had the same pattern of TVI . . . remember that the TVI disappeared on the phone bands using a kilowatt! It was a very strange kind of TVI (apparent only on the c.w. portions of the 20, 15, and 10 meter bands on Channels 4 and 6), and I was almost crazy with it. It would seem that practically every reasonable TVI precaution had been taken.

"After trying almost everything in vain, when I simply connected the neutral of the a.c. line through a #10 AWG wire to a cold-water pipe ground, it was like a miracle: the TVI disappeared completely, on any channel, operating on any band!"

Gerson concludes with the observation that " . . . reading the book, they say that when using a dummy load, if the TVI does not exist, the problem couldn't be in your shack *(Gerson's TVI disappeared when using a dummy load, suggesting that the problem was external to his ham-shack—ed.).* Following this rule, I spent a lot of time only verifying outside the shack, and I was wrong."

There is little we can add to Gerson's self-effacing observations, other than to comment that actions taken following the so-called "process of elimination" must be undertaken with extreme care when ordinary logic just doesn't seem to provide the right answers. Sometimes the most basic assumptions must be questioned and re-evaluated, as PY1APS and I both learned.

Changing gears once again, our suggestion to use tandem lowpass filters for an extra measure of harmonic suppression in the February 1983 column drew fire from John P. Weber, K4JW. John, rather correctly, criticized the "belt and suspenders" approach I had suggested; in the December issue we printed John's letter. A very interesting and instructive followup letter from John throws additional light on the subject about which he is well qualified to speak. Let's excerpt portions:

"Many hams use lowpass filters between their exciters and linears, but I have found a large number of them have run into trouble, especially the boys using the new soild-state rigs. They cannot get enough drive because of the mismatch, and the protective circuits start to 'phase-back' the output from the exciter to protect the transistors.

"Reflecting further on tube-output exciters, if one assumes no input matching network on the linear, the input impedance to it is a function of tube gain and the output load characteristics, assuming grounded grid operation. That is why many of the separate pi networks are designed for different termination impedances . . . .

"I authored an article in *Ham Radio*, 'An Anaylsis of ALC Circuits,' which appeared in the August 1981 issue, and in preparing it I studied 15 different commercially produced linears and also studied their input circuits. It was no surprise that Collins came closest to providing 52 ohm resistive loads on all bands, even though there is still a variation in input impedance as you deviate from band centers where the pi networks are set.

"On the subject of suppressing harmonics by using the lowpass filter, I found my Drake filter was 'leaking' r.f. due to leakage currents from the short cable

317 Poplar Drive, Millbrook, AL 36054

```
1 REM CBM-64 REFLECTED POWER
2 REM BY LEW MC COY W1ICP
3 REM CQ,FEBRUARY 1983
4 REM CBM-64 BY K.THURBER,W8FX
5 REM REWITTEN FROM SEPT 1983 CQ BY
6 REM LOUIS J.JACOBS JR. KN9V
7 REM MODIFIED BY LOUIS J.JACOBS JR.
9 POKE53280,1:POKE 53281,1:PRINT"■":PRINT"□"
10 PRINT" *** OPTION: VIDEO OR PRINTER ? V/P ***"
15 INPUTO$
20 IF O$="V"THEN 2000
25 IF O$="P"THEN 150
30 IF O$<>"V"AND O$<>"P"THEN 10
135 PRINT"□"
140 POKE 53280,1:POKE 53281,1:PRINT"■"
150 PRINT"□"
160 PRINT
170 PRINT"■ *** DETERMINING REFLECTED POWER ***■"
180 PRINT:PRINT:PRINT
500 INPUT "ENTER FORWARD POWER (WATTS)";F
550 PRINT
600 INPUT "ENTER MAXIMUM VSWR";VM
650 PRINT
700 INPUT "ENTER VSWR STEP SIZE";S
900 REM PRINT ROUTINE
910 OPEN4,4:PRINT#4
960 PRINT#4, ""SPC(18)"<FORWARD POWER IS";F;"WATTS >"
970 PRINT#4:PRINT#4
980 PRINT#4,"   VSWR",SPC(12)"REFLECTED PWR (W)";
982 PRINT#4,""SPC(9)"TRUE RAD PWR (W)"
985 PRINT#4
1000 REM CALCULATION
1010 FOR V=1 TO VM STEP S
1160 R=F*(((V-1)/(V+1))*((V-1)/(V+1))):T=F-R
1170 PRINT#4, CHR$(16)"03"V;CHR$(16)"30"R;CHR$(16)"56"T
1180 NEXT
1190 CLOSE4
1200 PRINT"□"
1210 END
1215 REM PRINTER LISTING ROUTINE
1300 CLOSE4:OPEN4,4:CMD4:LIST
1310 PRINT#4:CLOSE4
2000 PRINT"□"
2005 POKE 53280,1:POKE 53281,1:PRINT"■"
2010 PRINT"□"
2015 PRINT
2020 PRINT"■ *** DETERMINING REFLECTED POWER ***■"
2025 PRINT:PRINT:PRINT
2030 INPUT "ENTER FORWARD POWER (WATTS)";F
2035 PRINT
2040 INPUT "ENTER MAXIMUM VSWR";VM
2045 PRINT
2050 INPUT "ENTER VSWR STEP SIZE";S
2060 PRINT"<FORWARD POWER IS";F;"WATTS >"
2065 PRINT
2070 PRINTTAB(1)   "VSWR      REFLECTED PWR     ";
2080 PRINT"TRUE RAD PWR "
2085 REM CALCULATION
2090 FOR V=1 TO VM STEP S
2095 R=F*(((V-1)/(V+1))*((V-1)/(V+1))):T=F-R
3000 PRINTTAB(1)V;TAB(10)R;TAB(27)T
3005 NEXT
3015 END
```

Fig. 1–KN9V program modification.

from linear to filter, and also due to 'surface' currents going around the filter case due to insufficient r.f. grounding of the filter case to the linear chassis. I made a short section of RG-214 cable and a solid ground and cured the problem. The same problem would apply to a filter inserted between the exciter and linear.

"I published these results in a *73 Magazine* article ('Mods for the Clipperton-L,' Nov. 81), and think perhaps it explains why filters such as the Drake, Johnson, and others do not provide the attenuation we expect from them. This is in addition to the load mismatch affecting the filter's performance."

Speaking of mismatches . . . Lew McCoy's short reflected power detemination program which originally appeared in the February 1983 issue of *CQ* is certainly making the rounds. I adapted the program for the Commodore 64 computer and printed it in the September 83 column. My revised program required a printer for program output. Reader Louis J. Jacobs, Jr., KN9V, "operated on" the program again. He wrote:

"Was going through some of my old issues and found your article *(which contained the reflected power program—ed.)*; since I just got my Commodore 64, your article caught my eye. I typed in the program and, to my surprise, it ran the first time . . . thank you.

"It would be nice to have an option for that program for video or printer, so I was back to work again and came up with a little modification for your program. I hope you can reprint it for the people who don't have a printer . . . and hope to see many more programs for the Commodore 64."

Thanks to KN9V for submitting his program modification, which is shown here as fig. 1. Note that the program listing makes use of the special Commodore control and graphic symbols, which may look strange to some, but should be quite familiar to Commodore users.

We revisited the ever-popular Windom antenna in the January 1984 column. In this column we described a version of the Windom developed by Bob Grove, WA4PYQ, editor of *The Monitoring Times*. Bob's Windom was 134 feet long, fed 44 feet from one end using a 48.5 foot length of 300 ohm twinlead through a 4:1 balun to coax. We wondered if any readers had tried a half-size version of the antenna, which might have 22 and 45 foot legs, and asked for comments. Winston F. Jones, K4CWQ, took up the challenge and is able to provide us with some answers:

"I read with interest your mention of the Grove Windom dipole . . . since my yard was too small for the full-size antenna, I built the half-size version suggested in the article. The legs on my antenna are 22 feet and 45 feet, with the 300 ohm twinlead remaining at 48.5 feet. I use 14-gauge Copperweld and 300 ohm ladder line, along with a W2AU 4:1 balun and RG-8X mini-8 cable.

"First of all, the shortened version is good only for 40 through 10 meters. I managed to get my antenna up about 45 feet in the air, strung between two trees. On 40 meters the s.w.r. runs about 1.2 to 1.7:1. On 20 meters it is in the range 1.5 to 2.0:1. Ten meters also has a fairly low s.w.r., running in the 1.2 to 2.0 range in the phone portion of the band.

"Fifteen meters is the worst performer on my antenna. S.w.r. is up to about 3.0 over most of the band. However, I have had good results with 15 on my antenna,

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despite the high s.w.r. . . . on 80/75 meters, the s.w.r. is out of sight at 10:1 or more, completely unusable. I have used the antenna on the new 30 meter band with good results, though I don't know what the s.w.r. runs on that band, as my little homebrew 30 meter rig has no s.w.r. meter.

"I have talked with Bob Grove and corresponded with him, sharing my findings on the antenna. He reported similar results with the half-size version, and suggested adding 2 feet to the longer leg, since this improved s.w.r. some on his antenna. I haven't tried this yet . . . my only problem has been with some r.f. coming back into the shack . . . I work mostly QRP c.w. and have noticed much improvement when using the Grove dipole as compared with the old standard 40 meter dipole . . . ."

K4CWQ adds that he would like to hear from others who have used the shortened Windom in order to compare performance notes.

CQ 1750

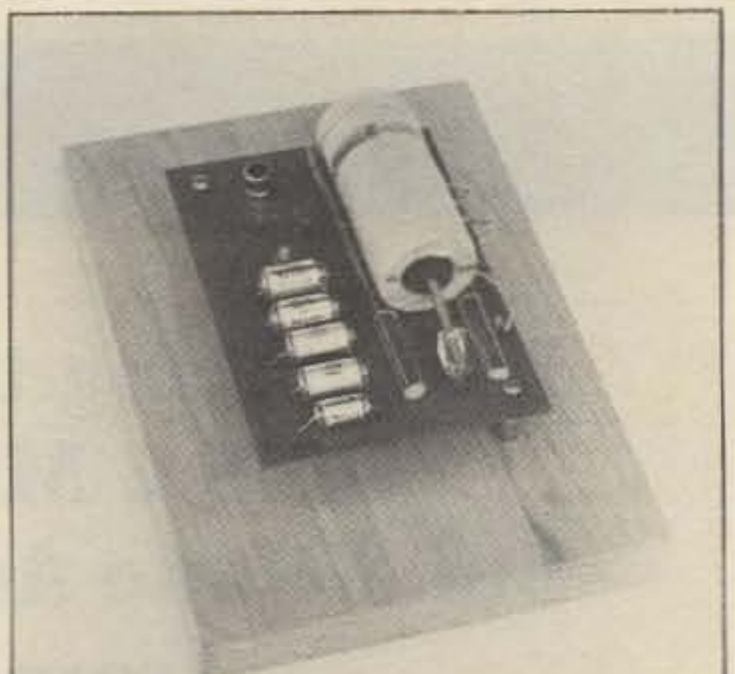
Have you ever heard of the 1750 meter band? Yes, Virginia, there is one, and it has been in existence since 1950 as an all-mode longwave band for experimental work. It's not an amateur allocation, however, and though anyone can use the band under Part 15 of FCC regulations, amateur callsigns may not be used in the band, which extends from 160–190 kHz. Indeed, many interesting experiments and enjoyable QSOs can be your reward for operating on 1750, and very simple equipment is needed. Some enthusiasts have made contacts over distances of 700 miles despite the limited power and antenna size restrictions.

Operation in the so-called 1750 meter band is allowed if the power input to the final stage of the transmitter (exclusive of filament!) doesn't exceed one watt; all emissions outside of the band are suppressed at least 20 dB below the unmodulated carrier, and the antenna length does not exceed 15 meters (50 feet), exclusive of ground radials and the antenna coupling coil.

By no means is 1750 an "appliance operator's band"; in fact, a rather special breed of old-fashioned experimenter tends to inhabit it. Transmitters are necessarily homebrewed, tuning and coupling arrangements are unconventional, and transmitting and receiving antennas are unusual.

A favorite transmitting antenna consists of a 15 meter section of vertical wire or tubing with ground radials, and sometimes a capacitive "top hat." Usable results are had with such a minimal antenna by installing a good ground system and by keeping antenna coupling losses as low as possible. Radiation resistance for the very short antennas used by experimenters at these frequencies is but a small fraction of an ohm, so radiation efficiency is very low, making every milliwatt of output and a good ground count.

Ken Cornell, W2IMB, is the acknowledged "dean" of 1750 meter experimentation, and he regularly issues a scrapbook of low-band information and articles



A "breadboard view" of the antenna matching network for the Palomar Engineers 1750 meter transmitter. The matching network is contained in a separate circuit board which is mounted at the base of the antenna. This is done because the overall antenna length is limited to 15 meters (about 50 feet), and this is generally interpreted to include the feedline, if any. The tank circuit capacitors are seen at the lower left, the tank coil at the upper right, and the movable loading coil just below it. A tuning slug is used to resonate the loading coil. Under the PC board, and thus not visible in the photo, is the VN88AF FET (field effect transistor). (Photo courtesy Palomar Engineers)

One of the very few, and possibly the only, commercially manufactured 1750 meter transmitters, as offered by Palomar Engineers. The transmitter runs 1 watt input in the 160–190 kHz experimenter's band, where QRP operation without a license is permitted under certain conditions. The unit shown is for c.w. operation, but can be a.m. modulated. It uses FT-243 crystals at 32 times the operating frequency. The firm also sells v.l.f. converters for 10–500 kHz reception on general shortwave and ham-bands--only receivers. (Photo courtesy Palomar Engineers)

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RS-50A, RS-50M, VS-50M	37	50	6 × 13¾ × 11	46
RS-35A, RS-35M, VS-35M	25	35	5 × 11 × 11	27
RS-20A, RS-20M, RS-20S, VS-20M	16	20	5 × 9 × 10½	18
RS-12A, RS-12M, RS-12S	9	12	4½ × 8 × 9	13
RS-10A	7.5	11	4 × 7½ × 10¼	11
RS-7A, RS-7B	5	7	3¼ × 6½ × 9 4 × 7½ × 10¾	9
RS-4A	3	4	3¼ × 6½ × 9	5

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which is quite useful to the initiate. Reprinted below is a review of the latest edition of Ken's 1750 meter scrapbook by Nick Hall-Patch, used with permission. The review appeared in the December 10, 1983 issue of the *DX Monitor*, the journal of the International Radio Club of America (IRCA). Wrote Nick last December:

" . . . This is the fourth edition (of the *Low and Medium Frequency Scrapbook*) . . . if you own one of the previous editions and have found it useful . . . the present edition is composed almost entirely of new material. This one is solid state oriented, whereas previous editions favored vacuum-tube technology. Ken Cornell, the author, often works on the principle that the forgotten MW/LW technologies of the past can be updated to give the DXer good results using components available today . . . devices such as the variometer and the regenerative preamplifier are given a new lease on life through the pages of this book. One section is devoted to the virtually lost art of homebrew coil winding, though with an emphasis on modern ferrite cores. A pair of homebrew mechanical coil winders are featured, as these are no longer commercially available. The detail in the mechanical drawings is impressive.

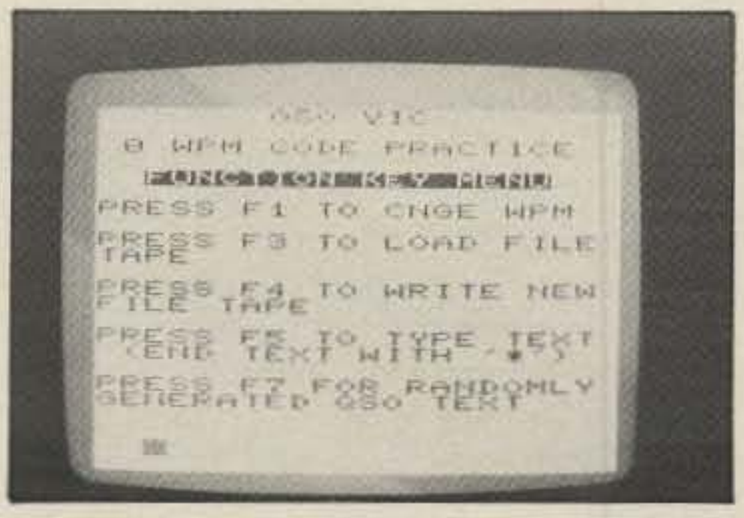
" . . . In spite of the title, the book is almost entirely about longwave circuits. Even the fine appendix of related articles in various publications is heavily oriented toward longwave. Mr. Cornell edits a column for the Longwave Club of America (LWCA) bulletin, the *Lowdown*, so this emphasis is hardly surprising . . . . In conclusion, it should be noted that this is definitely a 'scrapbook,' as the title states; it is not an overview of all facets of long- and medium-wave reception or transmission. It is, rather, a description of the many interesting projects the author and others have developed. A copy of this manual will be a useful addition to the die-hard experimenter's library, if he has one of the previous editions, but it should not be considered as an introduction to the technical side of long- and medium-wave DXing."

We thank the reviewer for his observations and recommendations. The 119-page book is available directly from Ken Cornell, W2IMB, 225 Baltimore Ave., Point Pleasant Beach, NJ 08742 for $10 postpaid.

Readers who would like to get a basic introduction to the "Lowfer" band may want to dust off their back issues of *CQ* for a short article by Pete Bradley, N1ADX, which appeared in the November 1979 issue. His article, "QRP on 1750 Meters," provides a good orientation to "what's happening" on the band. Lowfer activities are occasionally mentioned by other *CQ* columnists, and Lowfer articles appear from time to time in the amateur press. For example, S. J. DeFrancesco, K1RGO, described a c.w. beacon transmitter for 160 kHz in his article, "VMOS on 1750 Meters," which appeared in the October 1983 issue of *Ham Radio*. Readers may also enjoy an article entitled "Introductory 1750 Meters" by Michael Mideke, WB6EER, which appeared in our sister publication *Popular Communication*, February 1984, page 22.

Title screen from W9FI's Vic-20 Contest Logger program. The program can be set up to check for duplicate contacts, log and print contest QSOs, as well as store and retrieve QSOs from cassette tapes. The program requires a 16K expansion for the Vic. (W8FX photo)

The "Program Interrupt" screen of the W9FI Contest Logger program. A function key on the Vic-20's keyboard is used to interrupt the program to display the various special program functions which are available and to allow their activation. (W8FX photo)



The "QSO Vic" program from R. F. Tolli, KB4CSA, an example of inexpensive public-domain or "user-supported" software. Shown here is the main menu screen. (W8FX photo)

Software Notes

If you will excuse an excursion slightly outside of the realm of amateur antennas, we would like to mention two additional sources of amateur radio software for the Commodore 64 and Vic-20 computers. The first is from a commercial software house, the other from a public-domain source.

James Wysocki, W9FI, has made available a series of general-purpose and contest-logging programs for both Commodore computers through his firm, Microcomputer Business Applications (MBA), 4045 W. Mercer, Phoenix, AZ 85029. These programs are "The Log Book" and "The Contest Logger." The programs are priced at $24.95 each on cassette for either computer, and are packaged in an album which contains extensive documentation for the two programs.

I was quite impressed by the programs' quality, their professional packaging, and the clearly written documentation, which contained a great deal more information than that normally found in ham-oriented software in this price range. The programs are aimed primarily at the ham who owns a Vic-20 with at least 16K memory, or a Commodore 64, with a cassette recorder but not a disk drive. A printer is optional, but both RS-232C or Commodore serial printers can be accommodated.

According to Jim, MBA is primarily a business-oriented consulting company which specializes in applications for the IBM personal computer. His amateur-oriented offerings come from the encouragement of amateur friends in Phoenix, who were enthusiastic about the Commodore software he had developed for his own hamshack use. As a computer systems analyst and consultant, he has incorporated many professional software development techniques into his amateur radio programs.

In the "spirit of user-supported software," R. F. Tolli, KB4CSA, sent us a copy of a cassette program for the Vic-20 known as "QSO Vic." It's an instructional Morse code program which he wrote for the expanded Vic-20 to assist amateurs in studying for upgrade to the General class ticket. The program is available for $5.00, which includes a C-30 tape, copying, postage, and handling. Address inquiries about the program to R. F. Tolli, KB4CSA, Rt. 6, Box 233, Tallahassee, FL 32304.

Wrap Up

Our wordprocessor is full, so to speak, so it's time to quit this month. We've provided, hopefully, an interesting forum for reader correspondence, and have presented some background material on the little-known 1750 meter experimenter's band. We've also covered two sources of amateur radio software for Commodore computers. Next month we expect to continue with our reader forum and to introduce several new topics of contemporary interest. See you then.

73, Karl, W8FX

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATIONS AROUND THE WORLD

Just a year ago Ron Leite, PY1BVY, was on Fernando de Noronha Island, where he made over 6000 QSOs, working 104 countries in a c.w.-only operation. The island, 300 miles northeast of Natal State, is also the site of a Brazilian Air Force Detachment. Average temperature on the island is 26°C, or about 80°F, possibly because the island group is 3°55'S. All the operation was with an antenna setup that included a vertical, dipoles, and a long-wire for 78 meters. In the above picture Ron greets one of the local QRPers on the island.

Malpelo for the Future

It has been less than a year since HKØTU was last heard, and before long the country will start appearing on someone's needed-country list, if it is not already there. Malpelo has always been difficult for some areas.

At the International DX Convention in California a few months back the Liga de Radioaficionades Colombia sent a representative to show the slide show on the last Malpelo effort and to discuss what may come in the future.

Over the years Malpelo has been difficult for the western reaches and the Pacific. The rock rises out of the Pacific Ocean and the landing site is on the south side of the rock. Propagation paths to the west coast and Japan went right through the rock—right through but usually not very far. The early efforts camped on a shelf close to the landing spot, but with the problems of antenna location, the last effort moved their base further up.

The October 1983 HKØTU effort was from about 700 feet above sea level, and the results were better for many areas, especially during good propagation periods. However, the DXpedition also explored further sites all the way to the top of the rock over a thousand feet above the sea. The Colombian flag was raised above the higher peak on the island, and the broad ridge below the peak was tentatively selected as the possible site for the next effort in five or six years.

This location will give propagation in a 360° direction, certainly helping any Deserving DXer who previously has not worked HKØTU. It will also bring a logistical problem; all the gear, radios, etc., will have to be transported by hand a thousand feet up the rock. Keep in mind that gasoline weighs in at six pounds to the gallon, and water even a bit more. Transportation for all efforts has been arranged by the Colombian government, the recent effort being taken out to Malpelo aboard a Colombian marine research vessel. Moving everything up to the top will be an arduous effort.

When? Probably in four or five years. Every effort is a complex undertaking with an element of risk in making the landing and getting gear ashore. The LCRA has made all the efforts and will go again when it is obvious that there is a substantial need and demand for HKØTU. Late in the '80s would be a good guess, so don't start planning your vacation yet.

77 Coleman Dr., San Rafael, CA 94901

From the Russian Desk

In a note to WA6ZUC, Alf, UA4WCE, explains why some Russian oblasts may to hard to work (oblasts #11, #61, and #116, for example).

Oblast #11, Molodetchenskaya, has been invalid for the R-100 *O* Award since January 1960; #61, Drogobytchskaya, has been invalid since 1963; and #116, Balashovakaya, is also invalid, but Alf was unable to say exactly when that oblast was ruled so.

A few months back Alf and his friend Willy were planning a trip to and operation from Karshi in Uzbek to sign UI8C. They were well along in their planning and optimistic that everything was falling into place. If they have not been heard already, they should be heard soon.

With some of the new, perhaps at times unusual, Russian prefixes now being heard, some advice may help you understand the changes. You will still find the second letter in the callsign indicating the Soviet republic or country, but there are some new variations. RW3AZ is not a new one, but possibly is only downtown Moscow.

In the European Russian Soviet Federated Socialist Republic (RSFSR) you will encounter not only *A* as the second letter, but also *V, W, Z,* and *N.* Thus, the prefix can be UV or RZ. The Ukraine will be the only other with a variable prefix: *B, T,* or *Y.* All other republics will have but a single second letter for the prefix, such as the *UC* for Byelorussia or the *UI* for Uzbek. Some of these are not unknown to DXers, but the UT in the Ukraine may also be found with the new RT prefix.

The Russian club stations will not display the UK prefix, but will be issued calls from the normal prefixes. However, there will be letters in the suffix to indicate a club station, these being ending combinations from WA to ZZ. Thus, a station which once signed UK3ABO may be signing a call with UV3A*XO*, the XO from the segment indicating a club station.

Newcomers on 160 have been signing EZ, and sometimes EY, prefixes. In the future they will be issued regular calls to be retained permanently, the only possible change being an upgrade to the Russian First-Class license. Then there is a choice whether to retain the original callsign or acquire a two-letter suffix status callsign.

Possibly by now you may have run into RA, RV, or possibly some other combination. Initially they were expected to show in the Moscow area and later in the other call areas. You previously may have worked an *R* prefix on 10 meters; now they will be everywhere. The RA3 should be found now, and the RV3, RW3, and UZ/RZ3 will follow. Prefixes with UA3/UV3 and UW3 have been heard from downtown Moscow since 1946.

Essentially, you will find callsigns be-

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1098	W1NG	1100	KA7GXO

S.S.B.

1651	OH4PW	1653	JH1LZC
1652	W1NG	1654	JH7COM

C.W.

2253	WB1GOO	2256	G3VQO
2254	YU2CQ	2257	DK7QB
2255	W1NG		

VPX

238 ..... NL-7730

WPNX

218 ..... WBØVNN

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S.S.B.: 350 NE6I, OH4PW, W1NG, JH1LZC, KT1H. 400 W1NG. 450 W1NG. 500 W1NG. 550 W1NG. 600 W1NG, KKØL. 650 W1NG, K9BQL, WO4L. 700 W1NG. 750 W1NG, IØSGF. 800 W1NG, IØSGF. 850 I2DMK, W1NG. 950 IØPSB. 1000 KL7AF. 1200 W6RKP. 1250 W6RKP. 1300 W6RKP. 1350 W6RKP. 1400 W6RKP. 1450 W6RKP. 1500 W6RKP. 2100 IØAMU.

C.W.: 350 WB1GOO, W1NG, DK7QB. 400 WB1GOO, W1NG. 450 W1NG, JA7AZJ. 500 W1NG, ZL1BEK. 550 W1NG, KA7AIG. 600 W1NG. 650 W1NG, JA7FFN. 700 KA7T, W1NG. 750 W1NG, KA7T. 800 KA7T, W1NG. 850 AK9Z, W1NG. 900 W1OPJ. 1050 I2DMK. 1100 VE1MF.

10 meters:	OH4PW, W1NG, JH1LZC, DK5AD.
15 meters:	W1NG, JA7FFN, DK5AD.
20 meters:	W1NG.
40 meters:	W1NG, JA7FFN, W4BQY.
80 meters:	W1NG, DJ1YH.
160 meters:	W1NG.
Asia:	OH4PW, W1NG, WØULU.
Africa:	W1NG, DK5AD.
No. America:	WB1GOO, W1NG.
So. America:	W1NG, DK5AD.
Europe:	G3VQO, NL-7730, WB1GOO, OH4PW, W1NG.
Oceania:	DK5AD, W1NG, JH8NYK, IN3ANE.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

ginning with *R* starting to become as familiar as the *U*. It may be that the first of the new arrangements will be largely 2X2 calls.

The Colvins

Lloyd and Iris wound up their recent trip through South America with an operation from Juan Fernandez signing W6QL/CEØ. On this effort of their most recent tour CE3ACA accompanied them and was invaluable in the CEØ effort.

Enroute home to California the Colvins stopped to visit radio clubs in Uruguay and Argentina, were at the International DX Convention in Visalia, and were on the program at the Dayton Hamvention. Their South American tour lasted 6 months, from September 1983 to this April, and they operated from 9 countries with over 55,000 QSOs made from DX spots.

Perhaps it is fortunate for many DXers that Lloyd and Iris like what at times seems to be almost non-stop DXpeditions. Possibly they will show at the ARRL Convention on New York this month. Any time they are close, a DXer should use the opportunity to see and talk with them. They are always easily available, friendly to the new or low-total DXer, and willing to make the acquaintance of a DXer they may have missed.

Sometimes it may appear that these two have done so much, traveled so far, and been on the air from so many DX spots that they are taken for granted. However, these two are certainly something special as DXers. It is not believed that anyone else has operated from as many DX prefixes as have the Colvins. It is believed that no one has handed out as many DX counters as the Colvins, and certainly no one has as extensive a QSL file system.

Lloyd Colvin, W6KG, and Iris Colvin, W6QL, were named to the DX Hall of Fame in 1976. While they are visiting in the States during the summer, no DXer should miss seeing and hearing them.

SEANET World-Wide DX Test

This one is to run in two sections: the c.w. section on the weekend of July 21–22 and the phone section the weekend of August 18–19. You can work everything from 160 to 10 meters single/single, multi-band/single, and multi-band/multi. Power must be within limitations of the license held by the participant. Reports will be RST or RT plus serial numbers starting with 001 and increased by one with each contact. You get more points for working DUs, HS, YB, 9M2, 9M6, 9M8, 9V1, and VS8s; 20 points on 160 meters; 10 points on 80/40; and 4 points for 20, 15, and 10 meters. Any SEANET station not in the above listing will count half of the above points. Work a station outside the SEANET area and it may be good for DXCC but not for the SEANET Test. Anyhow, if you have reached this far, Eshee Razak, 9M2FK, P.O. Box 13, Penang, Malaysia, is the contest manager. Drop him a query, along with s.a.s.e., if you need more information or guidance.

The Pribilofs and the Vienna U.N. Center

On the second look at the Pribilofs, the matter ended with no decision, the DX Advisory Committee voting eight in favor of country status and eight against country status. The whole thing has been returned to the DXAC for further study, contemplation, and soul-searching. Another attempt at a decision probably will not be heard for some months.

On the Vienna U.N. Center and 4U1VIC, the study was under review a month or so back. Possibly it still is under study, but some decision should come before long. Several possibilities are being studied, including a move to allow all the United Nation entities to be DXCC counters, this only with some strict and explicit rules. Also a possibility to be considered is the deletion of the U.N. entities such as 4U1UN and, finally, the basis of all the study, and that is to make 4U1VIC a country counter.

Some of this is tied in with a study of the DXCC country criteria which has been

Those who were fortunate enough to have a QSO with Klaus as DL7NS/HBØ (the Principality of Liechtenstein) can QSL to his home call/QTH. Klaus is shown above at the QTH where he made 4050 QSOS mostly on 3.5 and 7 MHz c.w. (Photo via W2LZX)

The WAZ Program

15 Meter Phone

195 ..... JK1PTF

20 Meter Phone

493	VE3DLR	495	VE3KLE
494	ISØQDV	496	JI1QPU

40 Meter Phone

25 ..... I4EAT

All Band WAZ

S.S.B.

2825	I3ZSX	2832	KA9ABC
2826	IØOSK	2833	I4UFH
2827	I8QLI	2834	K9MNT
2828	NE8R	2835	WB3FID
2829	K6QS	2836	DL5JP
2830	OK3LZ	2837	G3BRD
2831	IØKPW		

C.W. and Phone

5730	HA8KVK	5739	I5LXK
5731	AIØO	5740	G3MYO
5732	I1ZXT	5741	G3ZRH
5733	G3GWT	5742	KA7JVW
5734	WØRIC	5743	W9CA
5735	DK2XZ	5744	N9AIB
5736	W4JD	5745	DL5MBY
5737	OK3TMF	5746	DL3GAF
5738	I5NOZ	5747	JA2DC

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the W A Z manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

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4X150A/7034	45.00
5AR4	6.24
5C22	165.00
5R4GB	3.85
6AK5	4.91
6AL5	3.86
6AQ5	3.77
6CA7	7.41
6DJ8	2.75
6JG6A	7.53
6JS6C	8.00
6KD6	8.85
6KV6A	6.92
6L6GC	6.93
6LF6	8.85
6LQ6	8.85
6MJ6	8.99
12AT7	3.87
12AU7	3.47
12AX7A	3.48
572B/T160L	49.50
705A	10.00
811A	13.50
813	40.00
829B	40.00
832A	38.00
833A	145.00
866A	9.50
872A	24.00
M-2057	15.00
5670	4.40
5684	33.00
5687	4.00
5751	4.00
5814A	3.70
5879	5.75
5894	65.00
6005	5.25
6146B	8.75
6360	6.50
6528A	75.00
6550A	7.50
6883B	10.00
7360	12.25
7558	7.00
7591A	6.20
7868	6.68
8072	95.00
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5 Band WAZ

Standings as of April 1, 1984

All 200 zones worked:

1. ON4UN	25. K5UR	49. YO3AC
2. K4MQG	26. K9AJ	50. K3TW
3. SM4CAN	27. SM3EVR	51. XE1OX
4. AA6AA	28. LA5YJ	52. VE7IG
5. W8AH	29. DL3RK	53. OK1ADM
6. W6KUT	30. N4WJ	54. CT1FL
7. EA8AK	31. G3MCS	55. WA1AER
8. LA7JO	32. SM5AQD	56. N4RR
9. EA3SF	33. WØMLY	57. UWØMF
10. OH1XX	34. IØRIZ	58. W4DR
11. EA8OZ	35. ON5NT	59. OK1MP
12. WØSD	36. OH6JW	60. W1NW
13. KØZZ	37. OK1AWZ	61. OE1ZJ
14. ON6OS	38. IV3PRK	62. HB9AHL
15. OK3TCA	39. DJ6RX	63. HB9AMO
16. K6SSS	40. OH3YI	64. LA6OT
17. ZL3GQ	41. I4RYC	65. UR2QD
18. OK3CGP	42. ZL1BIL	66. UK2RDX
19. SMØAJU	43. I4EAT	67. ZS5LB
20. OZ3PZ	44. ZL1BQD	68. F6DZU
21. I3MAU	45. TG9NX	69. DL4YAH
22. I2ZGC	46. XE1J	70. LA7ZO
23. 4Z4DX	47. F5VU	71. W9ZR
24. N4KE	48. W3AP	72. W1NG

The top 12 contenders for 5 Band WAZ:

1. VK9NS, 199	7. W8VUZ, 198
2. N4KG, 199	8. LA9GV, 198
3. DK5AD, 199	9. W6GO, 198
4. ZL1BOQ, 199	10. K4CEB, 198
5. JA3EMU, 199	11. OK1MG, 198
6. N4WW, 199	12. K6YRA, 198

256 Stations have attained the 150 zone level

praised, reviled, criticized, and defended at various times. As one bilious DXer was heard to say at Visalia, "Now that we are getting down to city blocks as DXCC counters, 4U1VIC does seem like a sure bet!" That may be an exaggeration, but there are some precedents and precedents are easier to make and observe than to discontinue. As many an Old Timer has leaped to his feet to cry, "It's traditional! It's a DX tradition!" And that is a DX poultice that is always useful. The new criteria should have been found in the June issue of *QST*.

The DX Forums

Some who have wandered from the paths of truth and DXing may consider the grand banquet at any amateur gathering as the highlight of the gathering. Don't you ever believe it! The supreme moment at any amateur radio meeting is always the DX Forum, sometimes followed closely by the Contest Forum. But the DX Forum—always the zenith—is never to be missed!

Here are some of the points that were raised at the Visalia International DX Meeting in April. Some are from the Contest Forum, and some are from the DX Forum.

The *CQ* WW DX S.S.B. Contest in October has a weekend for the phone operators, while the *CQ* WW DX C.W. test in November comes on Thanksgiving weekend with four days to travel, operate, and such. Why not alternate, phone in October one year, November the next?

In October and November there is a period with four contests on five weekends. Why not spread things out? Some suggest moving the ARRL Sweepstakes events, but this ran aground on the reef of tradition. Some then suggested swapping Sweepstakes with Field Day. Though greeted with cries of hilarious approval, this also went aground in tradition.

The question of duplicate entries in contest logging got it from all sides, there being as many solutions as complaints. Among the remedies suggested were the possibilities that the DX station does not sign its callsign often enough and duplicates come when a hot-shot contester is prospecting, and that some are insurance contacts when the experience of having an incomplete call in a DX station's log is an unhealed wound and the needed QSL a fallen hope. It was also suggested that DX stations are the ones who should keep dupe sheets and thus could check to avoid working a station more than once.

On the question of calling "CQ DX" in a contest there was both condemnation and defense. It was pointed out that a low-power station would be lost if it did not nail down a frequency and sit there calling "CQ DX." Some muttered that they were lost whatever they might do, that the problem would be eased if there were more credit for multipliers, that if they were not calling "CQ DX" they probably would be jumping in on the pileups and adding to the mayhem, that working split frequency might help, and finally, that many contesters will do what they think might work even if if does not.

Some speculated on the possibility of getting through by only shouting the last letter in one's call. Others said that the full call should be given, but the exchange pared to the minimum with the exchange structured to give all necessary information in one full breath. DX stations could help by just giving callsigns to signify that they are standing by rather than using the "QRZ." Other speculated that in contests the western reaches are not favored and must compensate by working the full JA call book to get a decent score.

On the question of country status being continued for Spratly, this was affirmed by the DXAC by a wide margin. There is attention being given to the methods and criteria for country deletion. Some work on this is being done with the objective of revising the deletion criteria so that it is both fair and flexible, provides for the interests of all DXers but is attentive to the needs of the individual, and is broad in terms, less in ambiguity, clear in specifics, and general in scope!

Eventually there should be new deletion rules, a written criteria for DXCC

Say You Saw It In CQ

CQ DX Awards Program

S.S.B.

1320	I3ZSX	1326	6C35O
1321	XE1LCH	1327	YU7KV
1322	WA9IVU	1328	OK3YEB
1323	OK1AWZ	1329	G4SVB
1324	KB9OC	1330	GW4KGR
1325	KD9CN		

C.W.

611	G4GCK

S.S.B. Endorsements

310	I8AA/315	275	K1VHS/287
310	K9RF/312	275	WD8PUG/283
310	W9SS/311	275	YU7KV/283
300	N6AV/308	250	XE1LCH/270
300	W6FET/302	250	XE1MDX/257
300	W2FGY/302	250	KB8KW/250
300	W6SN/300	250	GW4KGR/248
275	KB9OC/299	200	VE2EVO/243
275	K4CXY/296	200	WO4L/202
275	XE1OX/295	200	WA9IVU/201
275	K8VFV/294	150	I3ZSX/172
275	W6NLG/291	28 MHz	KB9OC
275	W4BQY/290	28 MHz	WA9IVU
275	KZ2P/289	28 MHz	I1ZHH
275	OK1AWZ/288		

C.W. Endorsements

310	W9DWQ/314	275	W6SN/296
310	N6AV/313	275	K4CXY/275
300	W4BQY/309	275	K1VHS/277

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

country status, and a vote on all requests for DXCC country credit by the DXAC. Sentiment at this time is against total deletion which would end the inclusion on the Honor Roll listings of the deleted countries in parentheses, against a restart on the DXCC marathon, and against DXAC becoming a policy body versus an advisory body. There will be an expansion of the award programs.

On the matter of acceptance of an operation for DXCC credit, it was noted that in most instances where amateur radio is a continuing thing with no known problems, an operation is usually accepted for credit without the need for documentation. Basically, proof of proper licensing and actual presence is all that is needed for documentation in routine cases.

In countries where problems are known or suspected to exist, a photocopy of the license and a passport with both entry and exit noted is required. These, along with some documented proof of permission to operate or to be in the country, may be needed when past experience has indicated that these are relevant matters. For islands where there may not be consular or embassy offices, certification by a ship's captain is usually sufficient. Generally, the overall objective is to preserve the integrity of the DXCC activity as well as to attempt to ensure that an individual's enthusiasm and desire to operate do not work to jeopardize the interests of amateurs in the country in question or in other countries.

An RTTY endorsable certificate is expected to be on line by September, and as mentioned already, a study is being made for more endorsable DX awards. An expanded 160 award should be announced around November and a satellite award is being considered. This involves consideration of a Low Earth Orbit basic sticker, a possible award that would be endorsable beginning with OSCAR 10. There may be more single-band awards including the WARC bands.

On the question of the Honor Roll listings and why are the honored calls not printed more frequently, this is a space problem, since these days it is lengthy.

On the matter of the African homelands, the ARRL rep was inexplicit. It is presumed that this means some day, when the heat might be over, but not now.

Some Final DX Notes

The ARRL has filed a motion with the FCC for expedited action on the proposed expansion of phone segments in the 75, 15, and 10 meter bands. This has been dragging on for two years, and it has been almost a year since comments were asked for in a Further Notice by the FCC.

The headquarters of the Sovereign Military Order of Malta. This is the QSL for working this recent new DXCC counter. The QTH is in the vicinity of Rome. Though it is not possible for visiting amateurs to put IAØKM on the air, a wandering DXer who shows when the station is being operated by the staff might find a spell as an operator.

The 1984 Northwest DX Convention will be held in Beaverton, Oregon, on July 28. The Willamette Valley DX Club will be the host for the gathering just outside Portland. Bob Herndon, W7XN, is the route for more details. The above photo was taken a year ago when John Minke, N6JM, DX Editor for WORLDRADIO, was caught interviewing Jim Hadlock, K7WA, then the president of the Western Washington DX Club. (CQ staff photo)

Perhaps by the time you read this something may have surfaced.

In the same ball park, five holders of experimental licenses for the 18 and 24 MHz band have filed a petition to permit U.S. amateur operation on these bands. Among those filing the petition were Stuart Cowan, W2LX, William Orr, W6SAI, and A. Prose Walker, W4BW. They include in the petition a request for c.w. in the whole band and s.s.b. in the top half of each band. It might be noted that the plans adopted in all three IARU Regions call for the top 58 kHz in the 18 MHz band and the top 60 kHz in the 24 MHz band to be c.w. and phone.

Wayne Green, W2NSD, filed a petition which was rejected, asking that amateurs be tested in code every two years, each test being at a 5 w.p.m. speed higher than the previous testing until a 35 w.p.m. rate was attained.

Dave Bell, W6AQ, was the Southern California's Ham of the Year and then Dayton Hamvention's Ham of the Year.

The FCC lifted power restrictions on 160 meters effective back around the

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CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 315. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsements involving the issuance of a sticker is $1.00.

C.W.

W6PT	315	W6ID	311	WA8DXA	302	W1WLW	289	K9IW	279
DL7AA	314	K4XO	309	K9QVB	302	SM6CST	286	W4BV	277
ON4QX	314	W4BQY	309	SM3EVR	300	WD9IIX	284	N8MC	277
W3GRS	314	K6LEB	308	W0IZ	300	W9RY	283	WB4RUA	277
N4PN	314	W4OEL	307	K3FN	298	K8PYD	281	K8LJG	277
W9DWQ	314	W1NG	306	W6SN	298	WA4JTI	281	K1VHS	277
K4CEB	313	DL3RK	306	DJ7CX	297	YU2RTW	281	K4SE	275
W8KPL	313	AA6AA	305	W0SR	295	K7ZR	280	DL1QT	275
N6AV	313	W9BW	304	K3UA	293	WA2HZR	280	W6YQ	275
K6EC	312	N4KG	304	W7CNL	292	I5XIM	280	W0HZ	275
K9MM	312	N4MM	303	AB4H	291	W2LZX	280	WA4DAN	275
K6JG	312	K1MEM	303	N5DX	291	WD9IIC	280		
N6CW	311	OK1MP	302	I3OBO	290	WD9IIX	279		

S.S.B.

K2FL	315	W0YDB	311	I0MBX	303	AI5I	294	YU7KV	283
W6EUF	315	N7RO	311	W6DN	302	I8ZTE	294	VP9CP	283
K6WR	315	W9SS	311	K1MEM	302	K8VFV	294	XE1OW	283
W3GRS	315	EA4LH	310	VE3MRS	302	K4SE	293	XE1OX	283
W3NKM	315	K6XP	310	N5FG	302	NA5W	293	VE3CKP	283
DL9OH	315	OE2EGL	310	W6FET	302	WD8MOV	293	VE3MV	283
W4UG	315	DK2BL	310	W2FGY	302	KB8KW	293	W0ULU	283
VE3MR	315	I3LLD	310	G4CHP	301	WB4UBD	293	AE5B	282
I0AMU	315	OE3WWB	310	VE3FJE	301	WA4LOF	292	CT1UA	282
F9RM	315	K4XO	310	K9HQM	301	I5BDE	292	KC8YM	282
VE3MJ	315	4Z4DX	310	WB4NDX	301	WB4KTG	292	AI9R	282
W4EEE	315	VE3GCO	309	W7OM	301	AC0A	292	I0SGF	282
I8AA	315	K8LJG	309	WA3HUP	301	W9RY	291	VE3DLR	282
W9DWQ	314	W2SUA	309	K8CMO	301	KV2S	291	TG9EP	281
I0ZV	314	DL6KG	309	W8ILC/QRPp	301	I2MQP	291	I1POR	281
I8KDB	314	N4PN	309	AI8S	301	VE3IPR	291	K9TI	280
K6YRA	314	VE7WJ	308	KU9I	301	N5AWS	291	N5FW	280
ZL1AGO	314	W1NG	308	WD8MGQ	300	WB3DNA	291	K8ZZU	280
ZL3NS	314	VK4VC	308	W4OHZ	300	KB5FU	291	VE3FEA	280
VE3GMT	314	YV5AIP	308	W6SN	300	WB6GFJ	291	W8IMZ	279
XE1AE	313	LU3YL	308	WA0TKJ	299	W4JFE	291	KA8T	279
I4ZSQ	313	ZL1BIL	308	I6PLN	299	W6NLG	291	KB5DN	279
W9KRU	313	N6AV	308	YU2RTW	299	KB3OQ	291	EA3KW	279
YV1KZ	313	N2SS	307	KB9OC	299	JH4PRU	290	W6MFC	278
W3AZD	313	VE4SK	307	DJ7CX	298	KK0C	290	AI8M	278
ZS6LW	313	K8PYD	307	K9SM	298	W4BQY	290	K4BYK	278
DJ9ZB	313	OZ8BZ	307	I8LEL	298	W4UNP	289	N9AMF	278
W4DPS	313	N4KG	307	K8NA	298	KZ2P	289	W6BQQ	278
N4WF	313	AA6AA	307	HP1JC	297	JA5PUL	289	I5EFO	278
K6JG	313	N4KE	306	K3UA	297	KM6B	289	VE3IUE	278
W9JT	313	K1UO	306	K5DUT	297	WD0BNC	289	KB3KV	277
VE2WY	312	W8PCA	306	JH1VRQ	297	W9TA	289	KB8O	277
F2MO	312	W0SR	306	WA4DAN	297	KR9O	289	KP4EQF	277
K9MM	312	K9BWQ	306	I0MBX	297	KC8JH	289	WB0UFL	277
N6AW	312	VE1YX	306	WA0DCQ	296	W7FP	288	W4PTT	277
K9LKA	312	N6OC	306	K9IW	296	K0GT	288	W0IYR	277
W3GG	312	YV5DFI	305	XE1NL	296	OK1AWZ	288	N7ASL	276
W9BW	312	W8ILC	305	K4CXY	296	I8KCI	288	WA6DTG	276
I8YRK	312	WB1DQC	305	WD9IIX	296	N2ATD	288	ZL1BOQ	276
OZ3SK	312	W2CC	305	VE4AT	296	K1VHS	287	WA4OPW	276
CT1FL	312	VK3JF	305	I8ACB	295	EA9IE	287	WA2FKF	276
W0SD	312	YU1DZ	305	IV3YRN	295	AB9E	287	VE6PW	276
K9RF	312	LA7JO	305	I3OBO	295	KB9KD	287	AI9U	276
K6EC	311	9H4G	304	K9UAA	295	KE3A	287	I8INW	275
W4SSU	311	WA4JTI	304	K9QVB	295	KB5RF	284	W8LKG	275
K4MQG	311	WA4WTG	304	SM4CTT	295	NA5W	284	WB3CQN	275
W0SFU	311	XE1J	304	WA9PWN	295	W0KU	284	WB1EAZ	275
I4LCK	311	XE1KS	303	XE1OX	295	N8BKF	284	VE7BSM	275
OK1MP	311	W2LZX	303	W1LQQ	294	WB3HAX	283	K8NWD	275
N4MM	311	W8JXM	303	KB8DB	294	WD8PUG	283	K4LR	275
K5OVC	311								

start of April. That's for retroactive operators. The ARRL's International Programs Manager, Nao Akiyama, JH1VRQ, has updated the general information package for any of the Deserving contemplating operating overseas (available for an s.a.s.e., try 37¢ postage as it is six pages long and the post office is sensitive about letters over a quarter inch thick).

Those special Olympic calls may be heard this month during the Olympics if the security requirements are ironed out. Security people for the games were not jubilant about the proposal when initially studied, but there was hope.

Though the plans for Clipperton last March just did not jell, the group is planning another effort. The planning had everything nailed down, but transportation stopped the whole operation. The charter, signed last November, for a sailboat then in Venezuela was thought to have enough leeway to allow for contingencies, but it did not. The first boat had motor problems and had to cancel out. Then in February it was the *Black Eyes*, then in Panama, but there were assurances it would arrive in Manzanillo in time for the departure which was already postponed to March 11. On March 14 it was learned that it was 500 miles away and it, too, had a busted engine. A rumored vessel north of Manzanillo could not be located, and finally on March 18 it was realized that time had run out along with the boats. You again will hear from the Clipperton group. They may have lost out this time, but they will be back.

LA9PCA is asking DXers to write to him supporting the idea of operating in Albania. He will vacation there later this year, and he wants a sheaf of letters to show the interest in some ZA activity. He also wants letters to show Norwegian authorities the advantages of including some DXers in the ship's complement when they make the annual Antarctic run late this year. You might even mention 3Y Bouvet.

Norm Koch, K6ZDL, our WPX Award Manager, received a letter from F9RM, and he advised us of French callsign changes. We will quote directly from his letter: "Effective 1 January 1984, there will be a new callsign allocation in France. There are now 5 categories of licenses: A, B. C, D, and E, and the PTT is going to modify the callsigns. The category will be included in the prefix, which means there will be FA, FB, FC, FD, FE series. New licenses have already been issued with the FD1 prefix. Corsica (ex-FC) has already moved to the TK1 to TK5 series in order to reflect the change. FB8 will move to the FT series. We do not know yet about the other French Territories. All callsigns will be changed by 1 January 1985 at the latest. As soon as I get the notification, I will be assigned FE9RM, which corresponds to the Extra category—John, F9RM."

QSL Information

The following QSL information was compiled with the help of W9LNQ.

CE0FCM to WB6WOD
CE0ZIA to KA1ILA
CT0BI to CT4UW
C30LAZ to EA3DPP (84 CB)
FK0AQ to F2BS
FO0JP to W1BBD
FO0KI to KA6LAF
FG0BKZ/FS7 to F6AJA
GB4ANT to G4ANT
H44R to H44DX
HC1OT to W2KF
HK0BKX WB4QFH
HP1XXO to WB5HXO
HR1DAP to K8CC
HR5SB/2 to WB0MZB
JT1BR to JT Bureau
JX5DW to LA9PCA
K9KU/HP1 to N9AVY
KR4C/PJ7 to KR4C
KZ8Y/8P6 to KZ8Y
N8DCJ/8P6 to KZ8Y
LA5VAA/0Y to LA5VAA
0D5OA to F0DDA
R1Z to UK1ZAA
T26FE to DL4BC
TI9WI to TI2J
TU73 to AK3F
VE7BBC/KH8 to VE7CXN
VP2VEB to W0DVZ
VP9KA to W1BPM
VQ9AC to KA3EDN
XE2FU to K5RK
YU3KI/5N8 to YU3KI
ZF2GW to W2HPF
ZP5LET to ZP5CVE
3D2DX to VE5RA
3V8PS to IN3RZY
5Z4ED to JH5FMU
AH9AB to Kniss, Box 248, Wake Island 96898
CE3FIP, CE6EDZ, & CE8ABF to Mario Andraca, POB 45, 7150 Ayachucho, Buenos Aires, Argentina
CE0FQV, CX2DX & CX3TU to Mario Andraca, POB 45, 7150 Ayachucho, Buenos Aires, Argentina
ET3PS to Box 6128, Addis Ababa, Ethiopia
CP1GH to P.O. Box 5968, La Paz, Bolivia
FM7CX to Boite Poste 604, Fort de France, Martinique
HG5A to HA7SU Magyar Balazs, Box 40, Nagykoros, H-2750 Hungary
HP1XGL to APO 1120, Miami, Florida 34002
IY4FGM to Box 3113, I-40100 Bologna, Italy
KG4DX to Bill Crews, Box 433399, Jacksonville, FL 32203
LA5DW/0Y to R. Kirkus, Box 88, N-5014 Bergen University, Bergen, Norway
OY8R to Box 343, Torshavn 3800, Faroe Islands
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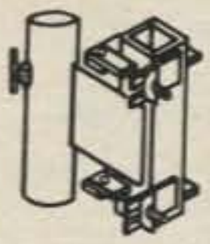

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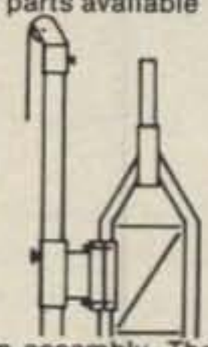

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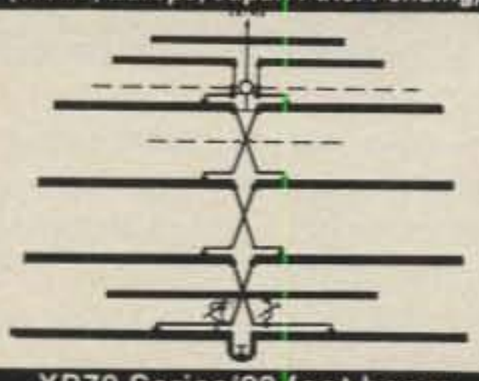

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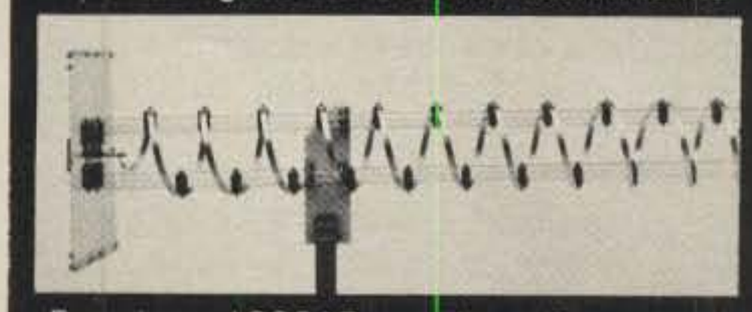

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CIRCLE 94 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

One of nature's strange phenomena, of considerable interest to radio amateurs, is expected to peak in its occurrence during July. This is the formation of sporadic areas of intense ionization in the earth's atmosphere capable of reflecting frequencies as high as 150 MHz over distances as great as 1400 miles.

Sporadic-E Ionization

There frequently form within the normal *E*-layer region of the ionosphere "clouds" or "patches" of abnormally intense ionization which are capable of reflecting radio waves of frequencies much higher than those reflected by the regular *E* or *F* layers. These clouds usually take the form of thinly ionized areas covering a rather small geographical region approximately 50 to 100 miles in diameter. They occur more or less at random and are relatively short lived, usually dissipating within a few hours. This sporadic ionization usually occurs about 60 miles above the earth's surface at about the same height as the regular *E* layer. For this reason it is called *sporadic-E*, or E_S.

Short-Skip Propagation

The height at which sporadic-*E* ionization usually occurs limits one-hop propagation to a maximum distance of about 1400 miles. Propagation beyond this distance does not occur often by way of sporadic-*E* because of the remote possibility of clouds being present over such a large area necessary for multi-hop propagation. For this reason, band openings due to sporadic-*E* propagation are often referred to as *short-skip* openings.

Reflection from sporadic-*E* clouds takes place with very little signal loss, since ionization is generally so intense. This results in exceptionally strong signal levels during most short-skip openings, even when very low power is used. Quite often it is possible to maintain communications between two stations considerably off the great-circle path by means of back and side scatter from areas of intense sporadic-*E* ionization. For example, stations in eastern and western New York state can work each other on *10* meters by pointing their antennas toward a common sporadic-*E* cloud located over North Carolina.

What Is Sporadic-E?

Although sporadic-*E* ionization has been studied by scientists and engineers for more than 30 years, its nature and origin still remain largely a mystery. However, some general characteristics about sporadic-*E* behavior are known.

Sporadic-*E* ionization varies geographically. It occurs most frequently, and with greatest intensity, in extreme latitudes in the vicinity of the earth's auroral zones, and in equatorial regions. In mid-latitudes, for example in the United States and Europe, it occurs most often during the late spring and summer months and during December, but hardly at all during other periods. In mid-latitudes, sporadic-*E* has a tendency to peak during the late morning hours and again around sunset.

Sporadic-*E* ionization is subject to erratic and often rapid variation. The ionized clouds are known to drift generally in a westerly or northwesterly direction at rates of approximately 150 to 250 miles per hour. The drift appears to be due to winds believed to exist in the ionosphere. Radio amateurs were responsible for first detecting this curious behavior of sporadic-*E* clouds during a research program (Project RASO) conducted by *CQ* for the U.S. Air Force during 1949 and 1950. Because of drift, reception areas can change within a relatively short period of time, and it is not uncommon for a sporadic-*E* opening to fade out completely from an S9-plus level in a matter of a few minutes.

What Causes Sporadic-E?

Scientists and communications engineers have been baffled by sporadic-*E* propagation ever since it was first observed more than 40 years ago. While it has been studied for some time, its cause is still unknown. Since it occurs more often during the hours of daylight, it appears that ultraviolet radiation might play a part in its formation. Its general behavior, however, does not coincide closely with the known pattern of ultraviolet radiation from the sun. Since sporadic-*E* also occurs quite often at night, especially in polar regions, some other source of ionization must also be responsible for its formation. Recent suggestions point towards ionization from meteor trails and from auroral displays as other possible sources. Another school of thought attributes sporadic-*E* formation to thunderstorms, changes in barametric pressure, and movements of air masses.

Predicting Sporadic-E Openings

Since little is known about the source of energy responsible for producing sporadic-*E* ionization, its behavior cannot be predicted by positive means at the present time. Statistical studies show, however, that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances as great as 1400 miles should be possible in the northern hemisphere for approximately 65% of the time on *15* meters, 35% of the time on *10* meters, and about 10% of the time on *6* meters. Two meter openings may also be possible during periods of intense sporadic-*E* ionization. While sporadic-*E* propagation can occur at any time of the day or night, it appears to peak between 8 and 11 a.m. and 6 and 8 p.m. Local Standard Time.

Here's a tip that has worked out very well during past years for determining when *10* and *6* meters would open for short-skip sporadic-*E* propagation. The geometry of skywave propagation is such that as the skip distance *decreases* on *15* (or *10*) meters, the highest frequency (MUF) that will be reflected by the sporadic-*E* cloud *increases*. By observing the minimum skip distance on *15* (or *10*) meters, the MUF in the direction of the skip can be determined from fig. 1 with fairly good accuracy, as can whether or not *10*

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for July 1984

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 2-3, 21, 29	A	A	B	C
High Normal: 1, 9-10, 18-19, 22, 24, 28, 30	A	B	C	C-D
Low Normal: 4, 8, 11-14, 17, 20, 23, 25-27, 31	A-B	B-C	C-D	D-E
Below Normal: 5, 7, 15-16	B-C	C-D	D-E	E
Disturbed: 6	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on July 1st, excellent (A) on the 2nd and 3rd, good-to-fair (B-C) on the 4th, fair-to poor (C-D) on the 5th, etc.**

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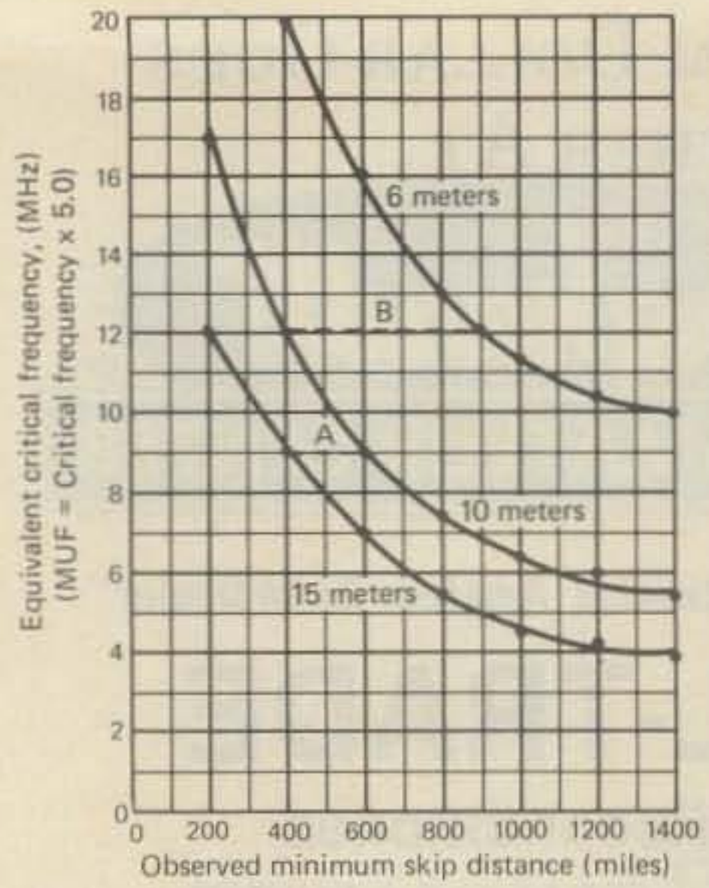

Fig. 1– Observed minimum skip distance versus equivalent critical frequency. (A) and (B) are examples. (A) Minimum skip distance of 400 miles observed on 15 meters; 10 meters should be open with skip greater than 600 miles; no 6 meter opening. (B) Minimum skip distance of 400 miles observed on 10 meters; 6 meters should be open with skip greater than 900 miles.

(or 6) meters is open and what the minimum skip distances are on these bands.

As an example (example B in fig. 1), the minimum skip heard on *10* meters in a southwesterly direction is observed to be 400 miles (it is the distance to the *nearest* skip station heard that counts in this case, not the furthest station heard). The intersection between 400 miles observed minimum skip distance and the *10* meter curve corresponds to a critical frequency of 12 MHz, or an MUF of 60 MHz, since the MUF is approximately equal to the critical frequency multiplied by a factor of 5. This means that the MUF is high enough for *6* meter (50 MHz) short-skip openings in a southwesterly direction. The minimum skip distance on 6 meters can be found from fig. 1 by locating the intersection between the 12 MHz critical frequency and the *6* meter curve. The resulting value of minimum skip distance is found to be 900 miles. A useful rule of thumb to remember is that when skip stations are heard less than *500 miles* away on *10* meters, or less than *350 miles* on *15* meters, the chances are very good that *6* meters will open in the same general direction as the minimum skip heard on these bands.

From most locations in the continental United States, 1400 mile openings should extend into both Canada and Mexico. From the southern third of the country it should also be possible to work a rather large number of countries in Central America and the West Indies during *15, 10,* and *6* meter sporadic-*E* openings. DX television reception also increases considerably during the summer months as a result of sporadic-*E* ionization. Signals from low-band v.h.f. TV stations (Channels 2–5), which normally cannot be received more than 75 or 100 miles away, suddenly are propagated up to 1400 miles, often with very strong levels. While freak DX television reception via sporadic-*E* may prove interesting, it will often cause interference to local stations on the same channels.

July Propagation

With long hours of daylight and the sun high in the northern sky, h.f. propagation conditions are generally more stable during July than at any other time of the year.

Twenty meters is expected to be the optimum band for long-distance propagation during the month. The band is expected to remain open practically around-the-clock to one area of the world or another, with peak conditions forecast for several hours after local sunrise, and again during the late afternoon and early evening hours. Fifteen meters is forecast to open fairly frequently during the late afternoon hours, especially on more or less north-south paths. A few *10* meter openings should also be possible during the afternoon hours, mainly to southern and tropical areas.

During the hours of darkness, *40* meters is expected to open to many areas of the world, but seasonally high static levels may often make DX reception difficult. High static levels are also expected to result in somewhat poorer DX conditions on *80* meters, although some long-distance openings are forecast during the hours of darkness. Not many DX openings are predicted for *160* meters during July because of seasonally high levels of static and solar absorption.

For shorter distance openings, try either *80* or *40* meters for daytime openings up to 250 miles, and *80* and *160* meters at night over this distance. For openings up to 750 miles, *40* meters should be best by day, and both *40* and *80* meters sharing the nighttime honors. Check *20* meters for daytime openings up to 1300 miles, with both *40* and *80* meters being best during the hours of darkness. Both *20* and *15* meters should be used for daytime openings up to 2300 miles, while *20* and *40* meters should do the trick at night.

This month's column contains detailed Short-Skip Propagation Charts valid for July and August 1984, as well as charts centered on Hawaii and Alaska. The Short-Skip Charts contain forecasts for openings between 50 and 2300 miles. For detailed DX forecasts over greater distances refer to the DX Propagation

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CIRCLE 77 ON READER SERVICE CARD

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint.* For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
July & August, 1984
Local Daylight Savings Time At Path Mid-Point

Band (Meters)	*Distance Between Stations (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	08-10 (0-1)* 10-14 (0-3)* 14-18 (0-1)* 18-22 (0-2)* 22-00 (0-1)*	08-10 (1)* 10-14 (3)* 14-18 (1-2)* 18-22 (2-3)* 22-08 (1)*	08-10 (1-0)* 10-14 (3-1)* 14-18 (2-1)* 18-22 (3-1)* 22-08 (1-0)*
15	*Nil*	08-10 (0-2)* 10-14 (0-3)* 14-18 (0-2)* 18-20 (0-3)* 20-22 (0-2)* 22-08 (0-1)*	08-10 (2)* 10-14 (3)* 14-18 (2)* 18-20 (3)* 20-22 (2)* 22-00 (1-2)* 00-08 (1)*	08-10 (2-1) 10-14 (3-2) 14-18 (2-3) 18-20 (3-4) 20-21 (2-3) 20-00 (2-1) 00-08 (1-0)
20	10-01 (0-1)*	07-10 (0-2)* 10-16 (1-4)* 16-21 (1-3)* 21-01 (1-2)* 01-07 (0-1)*	07-10 (2-3)* 10-17 (4)* 17-22 (3-4)* 22-01 (2-3)* 01-07 (1-2)*	07-10 (3-2) 10-16 (4-2) 16-17 (4-3) 17-22 (4) 22-00 (3) 00-01 (3-2) 01-07 (2-1)
40	08-12 (1-2)* 12-17 (2-4)* 17-21 (3-4) 21-23 (1-2) 23-08 (0-2)*	08-10 (2-4)* 10-12 (2) 12-17 (4-2) 17-18 (4-3) 18-21 (4) 21-23 (2-4) 23-05 (2-4) 05-08 (2-3)	08-10 (4-1) 10-17 (2-1) 17-18 (3-1) 18-21 (4-3) 21-05 (4) 05-06 (3-4) 06-08 (3)	08-18 (1-0) 18-21 (3-2) 21-06 (4) 06-08 (3-1)
80	07-12 (3-4) 12-16 (4-3) 16-22 (4) 22-05 (3-4) 05-07 (4)	08-10 (4-1) 10-12 (4-0) 12-16 (3-0) 16-18 (4-1) 18-20 (4-2) 20-22 (4-3) 22-07 (4) 07-08 (4-2)	08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (3-1) 22-05 (4) 05-07 (4-3) 07-08 (2-1)	08-18 (0) 18-20 (1-0) 20-22 (1) 22-04 (4-3) 04-05 (4-2) 05-06 (3-2) 06-07 (3-1) 07-08 (1)
160	18-19 (1-0) 19-20 (1) 20-22 (3-2) 22-00 (4-3) 00-06 (4) 06-08 (3-2) 08-09 (1) 09-10 (1-0)	19-20 (1-0) 20-21 (2-0) 21-22 (2-1) 22-00 (3-2) 00-04 (4-2) 04-06 (4-3) 06-08 (2-1) 08-09 (0-1)	21-22 (1) 22-01 (2-1) 01-04 (2) 04-06 (3-2) 06-07 (1) 07-08 (1-0)	21-23 (1-0) 23-01 (1) 01-06 (2-1) 06-07 (1-0)

* Predominantly Sporadic-E Openings

HAWAII
July & August, 1984
Openings Given in Hawaiian Standard Time

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	14-16 (1)	06-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-02 (2) 02-04 (3) 04-06 (2) 06-09 (1)	18-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)†
Central USA	14-16 (1)	06-08 (1) 08-13 (2) 13-17 (3) 17-18 (2) 18-19 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-20 (4) 20-23 (3) 23-03 (2) 03-06 (3)	18-21 (1) 21-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)† 22-00 (2)† 00-02 (1)†
Western USA	11-14 (1) 14-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-20 (4) 20-22 (3) 22-05 (2) 05-06 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)† 20-22 (2)† 22-02 (3)† 02-03 (2)† 03-04 (1)†

\# See explanation in "How To Use Short-Skip Charts" which appears in the box at the beginning of this column.

† Indicates best time for 80 meter openings. Openings on 160 meters are most likely to occur during those times when 80 meter openings are shown with a propagation index of (2), or higher. .

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

ALASKA
July & August, 1984
Openings Given in GMT

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	*Nil*	00-02 (1)	12-15 (1) 22-01 (1) 01-04 (2) 04-06 (1)	07-10 (1)
Central USA	*Nil*	21-00 (1) 00-03 (2) 03-04 (1)	13-16 (1) 22-00 (1) 00-03 (2) 03-05 (3) 05-06 (2) 06-08 (1)	08-12 (1)
Western USA	01-04 (1)	17-22 (1) 22-00 (2) 00-03 (3) 03-04 (2) 04-05 (1)	13-14 (1) 14-15 (2) 15-19 (3) 19-01 (2) 01-03 (3) 03-05 (4) 05-07 (3) 07-09 (2) 09-11 (1)	07-09 (1) 09-12 (2) 12-13 (1) 09-12 (1)†

Charts for July which appeared in last month's column. For an assessment of day-to-day conditions expected during the month, see the Last Minute Forecast which appears at the beginning of this column.

V.H.F. Ionospheric Openings

We have already discussed that seasonally peak short-skip sporadic-*E* openings are expected on 6 and 2 meters during July.

Check during the last few days of July for the possibility of meteor-scatter openings on the v.h.f. bands. The *Delta Aquarids* shower is expected to take place then, with a predicted maximum meteor count on the order of 20 an hour.

July is a very poor month for Trans-Equatorial (TE) propagation, and few, if any, openings are expected by this mode.

Some v.h.f. short-skip openings are likely to occur during auroral activity. Check the Last Minute Forecast for periods that are predicted to be Disturbed or Below Normal during July. These are the dates on which auroral v.h.f. openings may occur.

Solar Cycle

The present sunspot cycle seems to have reached a plateau in its decline. A smoothed sunspot number of approximately 50 is forecast for July 1984.

73, George, W3ASK

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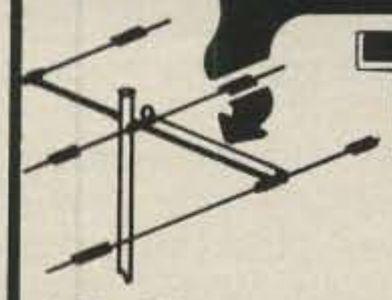

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Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

As reported in last month's Zero Bias, *The Guinness Book of World Records* has finally accepted Dick Spenceley, KV4AA's record of 48,100 QSOs in 1978. This is the first amateur radio entry in this book. I originally suggested to Dick that the *Guinness* people should be contacted for possible entry in their book. Proceedings were initiated in January 1979, but *Guinness* was not too receptive to our original letter, which not only included the 48,100 record for 1978, but also Dick's overall record of 195,000 from 1976–81. In the following months, substantial documentation was submitted by KV4AA and several amateurs and amateur radio publications.

Dick's untimely death on July 30, 1982 brought the campaign to a standstill. However, the correspondence was soon continued by Dick's widow, several of his close friends, and myself. A direct contact with *Guinness* made by Paul Essery, G3KFE, Editor of the British *Short-Wave Magazine*, was no small factor in the final acceptance of amateur radio in the *Guinness Book of World Records*.

My personal thanks to all you fellows who pitched in and continued the campaign. Too bad that Dick is not with us to enjoy the honor of being the first ham to appear in the *Book of Records*. I know that the Spenceley family extends their appreciation to all of you who made it possible.

Now that the gates have opened to amateur radio, what prevents other records from being published? Most QSOs in an hour, the Colvins totals, W6AM's most countries worked, etc.—it's up to you fellows. We have opened the gate for you.

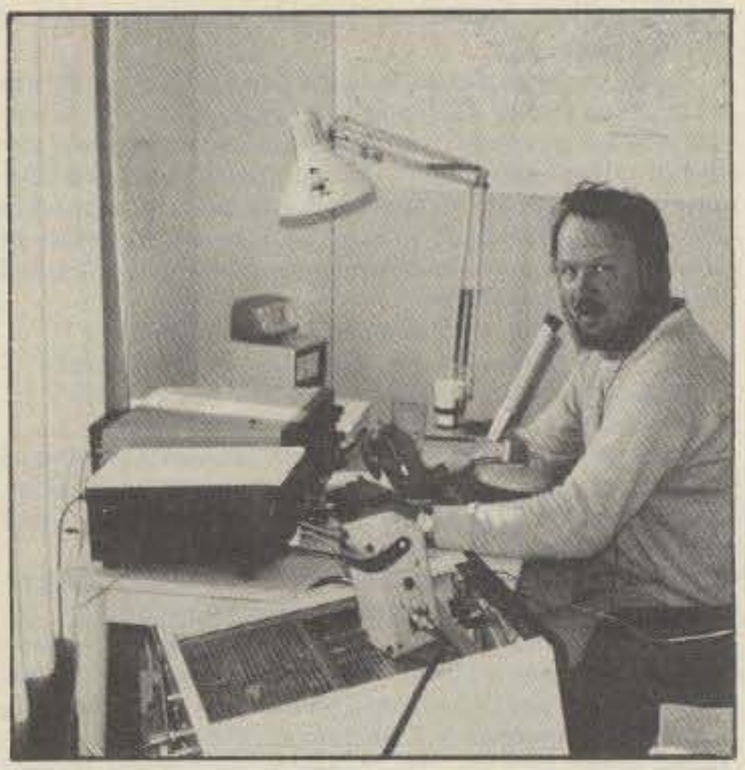
The usual reminder: July 15th is the deadline for material for the October issue, and August 15th for the November issue.

73 for this time, Frank, W1WY

Calendar of Events

*	July	1	Canada Day Contest
*	July	7-8	Venezuela SSB Contest
	July	14-15	IARU Radiosport Champion
	July	21-22	SEANET CW Contest
	July	21-22	AGCW-DL QRP CW Contest
	July	21-22	Colombia DX Contest
	July	28-29	Venezuela CW Contest
	July	28-30	County Hunters CW Contest
	July	28-30	"Armadillo Run" Contest
	Aug.	5-6	Illinois QSO Party
	Aug.	11-13	New Jersey QSO Party
	Aug.	11-12	DARC European CW Contest
	Aug.	18-19	SEANET SSB Contest
	Aug.	18-19	SARTG RTTY Contest
†	Aug.	25-26	All Asian CW Contest
	Sep.	5-6	YLRL "Howdy Days"
	Sep.	8-9	DARC European SSB Contest
	Sep.	15-17	Washington State QSO Party
	Sep.	15-16	SAC CW Contest
	Sep.	22-23	SAC SSB Contest
	Sep.	29-30	Delta QSO Party
	Oct.	17-18	YLRL Anniv. CW Party
	Oct.	20-21	Pennsylvania QSO Party
	Oct.	**27-28**	**CQ WW DX Phone Contest**
	Oc.31	-Nv.1	YLRL Anniv. Phone Party
	Nov.	9-10	DARC Euro. RTTY Contest
	Nov.	**24-25**	**CQ WW DX C.W. Contest**

**Covered last month.*
†See June Calendar.



Peter Tigersted, OH2BM/OH5NQ, managed 160 meter action at world-renowned 1982 multi/multi winning station OH0W. Peter is considered Finland's leading top-band operator with up to 100 countries worked from the world's worst top-band area. Peter has also worked W6RW as the only W6/OH QSO so far. Peter is a professor at Helsinki University and a visiting professor to many U.S. universities.

IARU Radiosport

0000Z Sat. to 2400Z Sun., July 14–15

The format is the same as it was last year. It's a worldwide competition, all bands, 160 through 2 meters, single and multi-operator.

Categories: Single operator, c.w. only, phone only, and mixed mode. Multi-operator use mixed mode, single transmitter.

Single operator stations are limited to 36 hours of operating time. Off times must be at least 30 minutes and must be indicated in your log. There is no time limit for multi-operator stations, but you must remain on a band at least 10 minutes at a time. The same station may be worked only once per frequency band regardless of the mode.

Exchange: RS(T) and your ITU zone.

QSO Points: Contacts within your ITU zone, 1 point. Contacts within your continent but a different zone, 3 points. Contacts with a different continent, 5 points.

Multiplier: Sum of different ITU zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the multipliers from each band.

Awards: Certificates to the top scorers in each category, in each ARRL section, each ITU zone, and each country. Achievement awards are available for making 250 and 1000 QSOs and/or contacting 50 or more zone multipliers. In case of multiple award levels achieved, only the highest award will be issued.

Disqualification rules will be observed for taking credit for duplicate contacts in excess of 2% and also for not observing rules and regulations of the contest.

U.S. and Canadian entries are requested to use official log and summary sheets, which may be obtained from the ARRL. A large s.a.s.e. with at least 37¢ postage will get you a good supply, and also an ITU zone list which appeared in the May issue of *QST* (and the June issue of *CQ*).

All entries should be sent to IARU Headquarters, Box AAA, Newington, CT 06111 U.S.A. Mailing deadline is August 15th.

SEANET DX Contest

C.W.: July 21–22 S.S.B.: Aug. 18–19
0001Z Sat. to 2359 Sun.

The object of the contest is to contact stations within the SEANET area. The same station may be worked once on each band. Cross-band or cross-mode contacts are not permitted, and multi-operator stations are limited to one signal during the same time period.

Classes: Single operator, single and all band, and multi-operator all band.

Exchange: RS(T) plus a three-figure QSO number starting with 001.

Scoring: *Stations outside SEANET area,*

(a) Contacts with stations within the NET area with the following prefixes: 20 points on 160; 10 points on 80 and 40; 4 points on 20, 15, and 10 (DU, HS, YB, 9M2, 9M6, 9M8, 9V1, V85).

(b) With stations in other NET areas: 10 points on 160; 5 points on 80 and 40; and 2 points on 20, 15, and 10.

(c) Contacts between stations outside the NET area have no value.

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Say You Saw It In CQ

DARC European Contest 1983 Phone Results

U.S.A.			
KC1F	1,395,603	WA5IYX	5,400
W9ZRX	342,305	KU7Z	4,944
N1AU	212,302	N6ZZ	4,114
N2VW	210,045	KX7J	3,344
AB8K	190,836	W5EIJ	2,360
W2DKM	165,699	W3BGN	2,340
N6AW	118,050	N4MM	1,482
KQ1F	109,532	KC7V	1,258
W3GM	92,364	W4YN	1,100
W3CM	90,922	AA6EE	378
N4UH	86,858	W9FJE	340
N6AR	83,430	N2BXV	48
W8UVZ	71,920	**Multi-Op.**	
WA4MOJ	65,037	K9MVM/Ø	72,369
W3ARK	61,936	K6OKW	66,490
W9RF	57,963		
WI4K	56,048	**Canada**	
KA2MXO	54,544	VE2ACP	68,514
W1IHN	52,992	VE3LAJ	52,326
N4BS	52,662	VE4RP	29,602
K2QF	51,870	VO1CA	18,527
KCØXK	50,436	VE1AJJ	14,634
K5KLA	40,590	VE2PD	14,364
W4IIR	39,260		
KF8K	38,732	**Hawaii**	
N5JB	34,398	KH6IJ	6,670
K6EID	31,776		
G3YBH/W1	23,712	**Continental Winners**	
K8MR	22,680	Europe	PA2TMS
WD6QVD	18,177	Africa	CT3BM
K3IXD	17,889	Asia	UA9CKC
KA1CLX	14,824	N. America	KC1F
W6OKK	11,940	S. America	ZY5EG
WAØDCQ	10,804	Oceania	VK6AJW
K2KTT	10,560		
W8VEN	10,317	KC1F was world high scorer for non-Europeans. W9ZRX was #7.	
N3GB	9,174		
W2GKZ	8,050		
WB9IWN	6,480		

(d) Multiplier of three for each NET country worked.

Stations within SEANET area,

(a) Contacts with stations outside NET area: 10 points on 160; 5 points on 80 and 40; 2 points on 20, 15, and 10.

(b) Between stations within the NET area: 6 points on 160; 3 points on 80 and 40; 1 point on 20, 15, and 10.

(c) Contacts with stations in own country have no value.

(d) Multiplier of 2 for each NET country worked, 3 if country outside NET area.

Final Score: Total QSO points times the sum of the multiplier points.

SEANET Prefixes: A4, A5, A6, A9, AP, BV, CR9, C21, DU, EP, HL, HS, H44, J (etc.), JD1, JY, KA, KC6, KG6/KH2, KH6, KX6, P29, S79, VK, VQ9, V85, VS6, VS9K, VU2, XU, XV5, XW8, YB, YJ8, ZK, ZL, 3B6/7, 3B8, 3D2, 4S7, 4X, 5W1, 5Z4, 8Q7, 9K2, 9M2, 9M6/8, 9N1, and 9V1.

Results will be announced at the SEANET Convention (place or date not given). Logs must be received no later than October 31st and go to Eshee Razak, 9M2FK, P.O. Box 13, Penang, Malaysia.

AGCW-DL QRP Contest

1500Z Sat. to 1500Z Sun., July 21–22

This is the summer edition of this QRP c.w.-only contest. The same station may be worked on each band, 1.8 through 28 MHz. There are five classes:

Class A—3.5 watts or less input. *Class B*—10 watts or less, for single operators. *Class C*—10 watts or less for multi-operators. *Class D*—QRO stations, over 10 watts input (may work only QRP stations). *Class E*—s.w.l.'s.

Class C may operate the full 24 hours; others must take a 9-hour break.

Exchange: RST, QSO no., and power input, i.e., (559001/5) (579001/QRO). Add "X" if using crystal control.

Scoring: QSO within own country, 1 point. With other stations in own continent, 2 points. With DX outside own continent, 3 points. (Double points if using crystal control.)

Multiplier: One for each DXCC country, and one for each DX station worked. Call areas in JA, PY, VE, W, and ZS count as separate multipliers.

Final Score: Total QSO points from all bands times the multiplier as indicated.

Awards: Certificates for the first places in each class and band.

Using a separate log sheet for each band, and a summary sheet showing the scoring, name and address, and other essential information. Mail logs within six weeks of the end of the contest to: Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, West Germany (include 1 IRC for a copy of the results).

Colombian Contest

0000Z Sat. to 2359Z Sun., July 21–22

This year's contest is in commemoration of the 174th anniversary of Colombia's independence. The exchange will be on a world-wide basis, all bands 1.8 through 28 MHz, both phone and c.w. There are four categories: single operator, single band and all band; multi-operator, single and multi-transmitter, all band only. Entries for all four categories are to be phone only, c.w. only, or mixed mode.

Exchange: *Non-HK's*—RS(T) plus a three-figure QSO number starting with 001. *For HK's*—RS(T) plus number 174 (indicating the years of independence).

Scoring: *Non-HK's*—QSOs with HK's 5 points. With other stations, 3 points. With stations in own country, 1 point. *For HK's*—QSOs with other countries, 5 points. With other HK's, 3 points.

Multiplier: Number of DXCC countries and HK call districts worked on each band.

Final Score: Total QSO points times the sum of the multipliers from each band.

Awards: Certificates to each station showing a minimum of 50 QSOs, at least 10 of which are with HK stations for phone entries, or 5 HK's for c.w. entries. Plaques to the overall winners in each category in each mode meeting the above requirements. Also to HK's in each call area.

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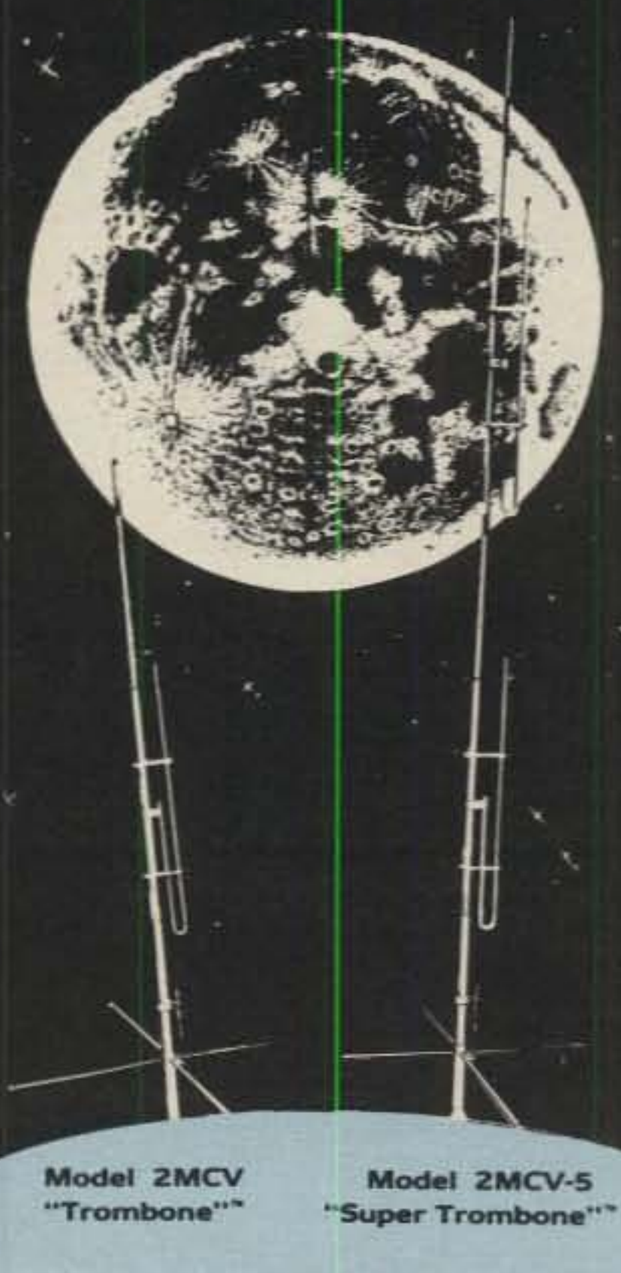

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Use a separate log sheet for each band. Indicate the multiplier in a separate column only the first time it is worked on each band. A summary sheet showing the scoring and all essential information and the usual signed declaration are also required.

Disqualification rules regarding taking credit for duplicate contacts, violation of rules and regulations, etc., will be strictly enforced.

Mailing deadline for all entries is August 30th to: L.C.R.A. Contest, P.O. Box 584, Bogota, Colombia.

County Hunters C.W. Contest

0000Z Sat. to 0200Z Mon., July 28–30

The C.W. County Hunters Net is promoting this year's contest. Mobile and portable operation from less-active countries is welcome and encouraged.

The same station may be worked on each band, mobile and portables from each county change, for QSO credit. Mobiles operating on county lines give and receive one QSO number, but each county is valid as a multiplier. (Mobiles and portables must identify by signing /M or /P after their call.)

Exchange: QSO no., category, county and state for U.S. stations, province or country for others.

Scoring: QSOs with fixed stations are worth 1 point; with mobile and portables, 3 points. Multiply total QSO points by sum of U.S. counties worked for your final score.

Frequencies: 3575, 7055, 14065, 21065, 28065. On 20 and 40, mobiles and portables should call CQ below the suggested frequency. Fixed stations use above the suggested frequency.

Awards: Certificates will be awarded to the winners in three categories: F—Fixed or fixed portables in each state, province, and country with 1,000 or more total score; P—Portable in each state operating from a county other than his normal location with 1,000 minimum score; M—Mobile in each state operating from 3 or more counties with a minimum of 10 QSOs at least from each of 3 counties.

Plaques to the top-scoring mobile and portable in the U.S. who also meets the above requirements. (Mobiles and portables who change states, calculate your score for a state certificate, and give the total score for the plaque.)

A summary sheet showing the scoring is requested, and a check sheet of counties worked is a must for entries with 100 or more contacts. Mailing deadline is September 1st to: C.W. County Hunters Net, c/o Jerry Burkhead, N6QA, 7525 Baltic St., San Diego, CA 92111 (include a large s.a.s.e. for a copy of the results).

"Armadillo Run" Contest

0001Z Sat. July 28 to 0200Z Mon. July 30

The Texas DX Society has again scheduled this activity at the same time as the County Hunters C.W. Contest. Last year's "Run" was a smashing success. All Texas counties were activated. (Jim White, K1ZX/4, worked all 254 counties.)

This year the TDXS is concentrating their operation on the states of Louisiana, Mississippi, and Arkansas, and they again hope to activate all counties by dispatching teams of mobiles to areas where there is no activity.

Exchange: The same as that used by the County Hunters: QSO no., RST, category, county and state for U.S. stations, province or country for others.

Scoring: The total number of LA, MS, and ARK counties worked during the contest period. Ties will be broken by the QSO count.

Frequencies: On c.w. only, of course. Mobiles will generally be active during daylight hours and will be found on 14055–14075 MHz. Check the County Hunters contest rules for activity on other bands.

Awards: Certificates to all entrants contacting at least 50 or more LA, MS, and ARK counties. Endorsements for following county levels: 100, 150, 175, 200, 225, and 250 (better scratch the 225 and 250, fellows. The county total for the 3 states is 221. Hi!). A unique plaque will go to the station operator contacting the most LA, MS, and ARK counties.

Your log should contain the following information: station worked, time in UTC, band, and the county from which your station was operating. Mailing deadline is August 31st to: Armadillo Run Chairman, Dennis Motschenbacher, KZ5M, P.O. Box 82, Thompsons, TX 77481. Write to KZ5M for additional information. QSLs for "Run" contacts may also be sent to the above address, and the TDXS will make a special effort to ensure delivery.

Illinois QSO Party

1700Z Sun. to 0500Z Mon., Aug. 5–6

This is the 21st annual party sponsored by the Radio Amateur Megacycle Society. The same station may be worked on each band and each mode.

Exchange: RS(T) and QTH. County for Illinois stations; state, province, or country for others.

Scoring: One point per QSO; 2 points if it's with a Novice or Technician.

Illinois stations multiply total QSO points by the sum of states (maximum 50), VE/VO call areas (maximum 10), and no more than 5 DX countries worked (maximum multiplier of 65). Additional DX contacts count for QSO points only. Out-of-state stations multiply total Illinois QSO points by Illinois counties worked (maximum of 102). Illinois mobiles and portables operating away from their normal QTH may add 200 points to their final score for each county of operation from which 10 or more QSOs were made. There is a bonus for all stations—a multiplier of one for each group of eight contacts with the same county.

Frequencies: C.W.—40 kHz up from low end of band. S.S.B.—3890, 7230, 14280, 21375, 28675. Novice—25 kHz from low end of each Novice band.

Awards: Certificates to the top scorers in the following categories: Single operator, multi-operator, mobile, portable, Novice, and Technician; in each state, VE/VO province, DX country, and first 3 places in Illinois; also club awards.

A summary sheet is requested showing the scoring and other essential information. Include a large s.a.s.e. for a copy of the results. Mailing deadline is September 1st to: RAMS, Att: K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634.

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THE INS AND OUTS OF THE WASHINGTON SCENE

CQ Presents Exclusive Interview With Chief Scientist of The FCC, Dr. Robert Powers

Elsewhere in this issue readers will find a penetrating exchange with the Chief Scientist of the Federal Communications Commission, Dr. Robert S. Powers, Jr. The interview takes a hard look at the purpose of the Office of the Chief Scientist (OST), at how the Office is structured and staffed, and at major issues such as radio-frequency (r.f.) standards, "unregulation" of the amateur service, and implementation of the new WARC bands. Also explored are the Russian "woodpecker," the next World Administrative Radio Conference, and OST's view on the no-code issue. For a comprehensive view of the issues facing the Amateur service today as seen by the Chief Scientist of the FCC, don't miss this month's exclusive interview with Dr. Robert S. Powers, Jr.

Commission Invokes Provisions of McKinney Letter

In April 1983, James McKinney, then Chief of the Private Radio Bureau (PRB), wrote a letter to the Tri-State Amateur Repeater Council (New York, New Jersey, and Connecticut) in which he stated:

"The Commission is persuaded by . . . observation that . . . national frequency planning and coordination by amateur radio operators themselves can result in the best spectrum utilization appropriate to the service." McKinney went on to comment that amateurs who persist in operating an uncoordinated repeater that causes interference to the operations of coordinated repeaters may be cited for not observing "good amateur practices." Finally, McKinney said that in addressing disputes involving coordinated and uncoordinated repeaters, the FCC intends to take into consideration documents such as nationally promulgated bandplans, and coordination records and correspondence. In the absence of any official documents, the FCC, it appeared, would draw on information on coordination from the ARRL Repeater Directory.

According to the Commission, it has now used this letter as the basis for removing an uncoordinated 2 meter repeater from the air. The repeater, located in San Diego, CA, was found to be the source of interference to a coordinated repeater in the same area. After investigating the situation, the FCC's San Diego field office ordered the trustee of the uncoordinated repeater to take his system off the air. It is expected that the Commission will shortly take similar enforcement actions in other parts of the country.

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Simpatch: The Debate Goes On

Simplex auto-patch ("simpatch") telephone interconnect devices continue to be the subject of debate within the amateur community. Not only are amateurs unsure about the rules that govern the operation of the devices, but there is a question of whether amateurs should even be getting into the business of using what amounts to a cordless telephone in the amateur bands.

Will the FCC take rule-making action in this matter? "Not unless we receive a Request for Rule Making," says Ray Kowalski, Special Services Division, PRB, FCC. "The Commission is not in the business of trying to read amateurs' minds."

Division personnel expect that if a Request for Rule Making is forthcoming, it most likely will come from one of the many repeater coordination councils across the U.S., as these groups have both the interest in, and information on, the anticipated impact of simpatch use.

Beyond questions of their use, however, lie concerns relative to the danger that simpatch poses to the Amateur service itself. "The whole question of what service should be given access to what band—say, the 220 or 420 MHz band—is now being decided as we implement the Decisions of WARC-79," said John Johnston of the Special Services Division. "This fact, plus the increased competition for frequencies that resulted from the AT&T divestiture, suggests that companies that are in the business of providing mobile telephone service may seek access to frequencies used by amateurs for simpatch operation since there is nothing here to distinguish the amateur from the commercial operator."

"All in all," said Johnston, "this may not be the best of times to introduce simpatch into the Amateur service."

FOB Holds Conference in Washington, DC

During the week of March 18–24, 1984, the FCC's Field Operations Bureau held a conference for all the Bureau's supervisors. Participating were FOB Regional Directors, Engineers in Charge of District Offices, and monitoring station and headquarters personnel. The theme of the conference was "The Future is Now."

Chairman Mark S. Fowler, FCC, Managing Director Edward Minkel, and FOB Chief Richard Smith set the tone for the week's activities in their opening remarks to the attendees at the Conference's formal opening. Simply put, the purpose of the Conference was to update FOB personnel in the rapidly changing areas of administration, enforcement, public-service programs, technical issues, and international relations. Conference participants also met with Private Radio Bureau Chief Robert Foosaner, Mass Media Chief James C. McKinney, and Chief Scientist Dr. Robert Powers. Several items of interest to amateurs were discussed. They included:

1. *Amateur Volunteer Examination Program.* It was announced that five volunteer examiner coordinators had been appointed. Also mentioned was the FCC's recent Notice of Proposed Rulemaking (NPRM) which would allow both the volunteer examiner (VE) and VE Coordinator (VEC) to be reimbursed for out-of-pocket expenses incurred in connection with the volunteer administered amateur tests. Current VECs will be performing their services on a no-cost basis until the NPRM is finalized.

2. *Interference to Amateur Repeater Operations.* The Private Radio Bureau's policy on revocations was restated. This policy holds that revocation of amateur licenses for malicious interference is the appropriate penalty for this type of activity. The FOB's technical staff also discussed enforcement techniques which they found effective in apprehending violators. There was general agreement that

Say You Saw It In CQ

amateurs have been a valuable asset to the FOB in their enforcement activities.

3. *Volunteer Amateur Auxiliary Monitoring Program.* Participants at the Conference were advised that discussions with a number of large amateur groups were nearing conclusion, and it was anticipated that agreements will be signed in time for the program to begin in FY-85 (October 1, 1984). The agreements will establish an amateur auxiliary to provide volunteer assistance to amateurs in their on-the-air activities.

Dialogue Continues Between FCC and Amateurs on Net Operations

As reported here some months ago, Ray Kowalski, PRB, FCC, has called for amateurs to enter into a dialogue with him regarding net operations. His interest in nets stems largely from rule abuses the Commission has observed (e.g., the use of phone patches to circumvent toll charges) as well as from the large number of co-channel interference complaints lodged with the Commission because nets tend to lay claim to the "net frequency."

While it is unknown at this time whether the Commission will issue a Notice of Inquiry in the matter or simply issue a policy statement, Kowalski requests that amateurs consider the following questions and share their views with him:

1. Does net operation, in general, equate to "good amateur practice"?
2. Are there special problems with large-scale nets?
3. Would a time limit on net sessions be a solution?
4. Are FCC rules concerning net operations needed?
5. Should the FCC redefine or codify the rights of the first party on frequency?
6. Should there be assigned frequencies or subbands for nets?
7. Are abuses (e.g., phone patches) the real problem?
8. Is the problem even larger than envisioned (involving, for example, a general breakdown of the "considerate operators' agreements"), or are net problems really no different than repeater problems or disregard of the 75 meter DX window, for instance?

Amateurs wishing to comment informally on the issue of net operations are encouraged to send their views to Mr. Ray Kowalski, Chief, Special Services Division, Private Radio Bureau, Federal Communications Commission, 1919 M St., NW, Washington, DC 20554.

ARRL and FCC Sign Agreement on FOB Auxiliary

The ARRL and FCC have signed an agreement to implement a so-called "Field Operations Bureau Auxiliary." The Auxiliary was created for the purpose of assisting the FOB in dealing with all aspects of amateur radio, and according to sources within the Commission, it is specifically intended to further the Commission's desire that our service be "self-administrating" and "self-regulating" when it comes to routine matters.

Among the issues to be addressed by the FOB Auxiliary is that of enforcement. To that end, the League's corps of Official Observers (OOs) will form the base for amateur involvement in the new Volunteer Enforcement Program now under development by the FOB.

Cable TV Problems Heat Up

While the FCC deliberates RM-4040—a petition which, if approved, would require CATV operators to vacate channels E (144–150 MHz) and K (222–228 MHz)—amateurs continue to have their problems with cable television interference (CATVI). And judging from the mail on this issue, more than a few amateurs are getting fed up with the lack of attention paid to the interference problems they report to local cable operators. As one amateur put it: "We are not going to babysit an industry that doesn't care to police itself, and (that) just wants to supplement their own employees with the amateur community."

Some cable operators have done the smart thing . . . they've vacated Channel E! Others, however, continue to operate systems that leak signals into the air and disrupt amateur communications. These cable operators should understand that a leaky system is a two-way street. And in addition to the interference they generate in the amateur bands, the potential exists for their cable systems to experience interference from amateur operations. This not only angers viewers, but could result in a loss of revenue as well, as viewers ignore Channel E because of poor picture quality.

Amateurs experiencing interference with CATV systems are urged to file reports with the following groups: American Radio Relay League, Attn: CATVI Desk, 225 Main Street, Newington, CT 06111;

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and Federal Communications Commission, Attn: Field Operations Bureau, 1919 M St., NW, Washington, DC 20554.

Entry-Level Engineers Face Bright 1984

According to IEEE *Spectrum*, "U.S. college graduates in engineering can expect a warmer reception at the entry-level job market in 1984." Reviewing "Recruitment '84," a report from College Placement Council, Inc., *Spectrum* noted that employers will recruit 21 percent more engineering graduates with bachelor's degrees this year than they did last year. Demand for electrical engineering graduates alone is expected to rise by 10 percent, with most of the demand coming from aerospace, electronics, and instrumentation corporations.

Salaries, too, are on the rise. According to "1983 College Recruiting Report" from Abbott, Langer & Associates, 1983 engineering graduates as a whole started their careers with an average salary of $24,900—almost 3 percent higher than the average salary paid in 1982. However, chemical engineering graduates made out the best; in 1983 their average starting salary was $26,100.

Naval Observatory Provides Time By Telephone

With the Bell System divestiture and the subsequent elimination of time services by some of the local Bell companies, the void has been filled by the Naval Observatory. By dialing 900-410-TIME, the military and scientific community as well as the general population can now obtain a voice announcement of the time based on the Master Clock at the Observatory . . . the most accurate and reliable time standard in the world!

The new time service uses dedicated landlines. Thus, calls placed over terrestrial lines will have delays usually no longer than 25 milliseconds (satellite services can cause propagation delays of up to 240 milliseconds). Up to 8,000 simultaneous calls can be accommodated, with callers able to stay on the line as long as desired. A constant ticking in the background allows scientific users to synchronize equipment.

Callers using the new service will be charged on a pay-as-you-call basis: $0.50 for the first minute and $0.35 for each additional minute.

The staff of CQ joins your Washington Editor in congratulating Dr. Larry Price, W4RA, and Mr. Leonard Nathanson, Esq., W8RC, on their election to ARRL President and First Vice-President, respectively. We also congratualte Mr. Carl Smith, WØBWJ, on his appointment as IARU Vice President.

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Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Non-commercial ads free to CQ subscribers, as space permits, maximum 3 lines each. All ads must be typewritten double spaced. Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

QUALITY TOWER ACCESSORIES TO SOLVE YOUR PROBLEMS: SO-1 standoff brackets for small 2 meter, Ringo, TV antennas, $34.50. SO-2 Heavy-duty standoffs for large 2 meter, beams, commercial, $59.50. MA-1 and MA-2 mast adapters put the top of your tower mast to good use, $22.50. GP81 and GP51S Ginpole Kits provide safety for your tower work, $129.50. BG-18 tower mast for those big beams, $249.50. These accessories work fine on all tubing-type towers. Special accessories can be custom made to order. Request our 1983 catalog. Visa, Mastercharge. IIX Equipment Ltd., P.O. Box 9, Oak Lawn, IL 60454. Phone 312-423-0605.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 2:00–3:00 PM Eastern. 1 Pryer Manor Rd., Larchmont, NY 10538.

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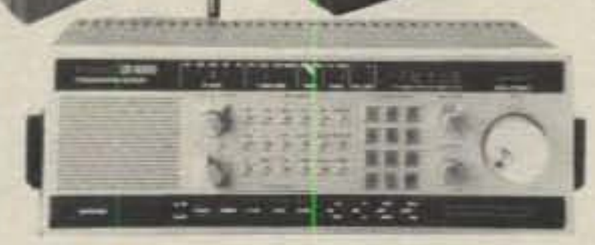

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WANTED: Globe VFO. Fred, Box 706, Orange City, FL 32763.

WANTED: Gilfer Associates GAR-7 frequency counter for Yaesu FRG-7 receiver. Also, frequency counter for Heathkit HW-101. George Ellison, Rt. 1, Box 146-B, Eatonville, WA 98328.

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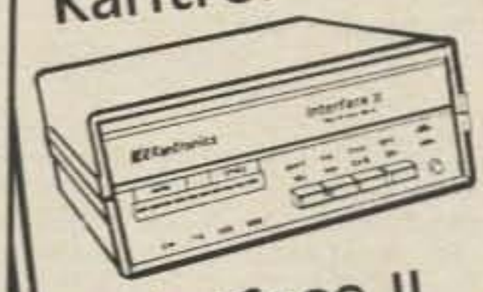

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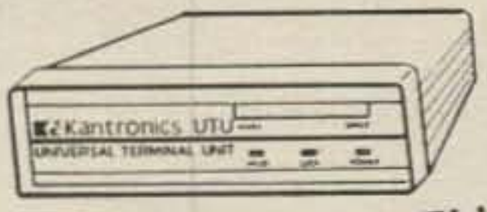

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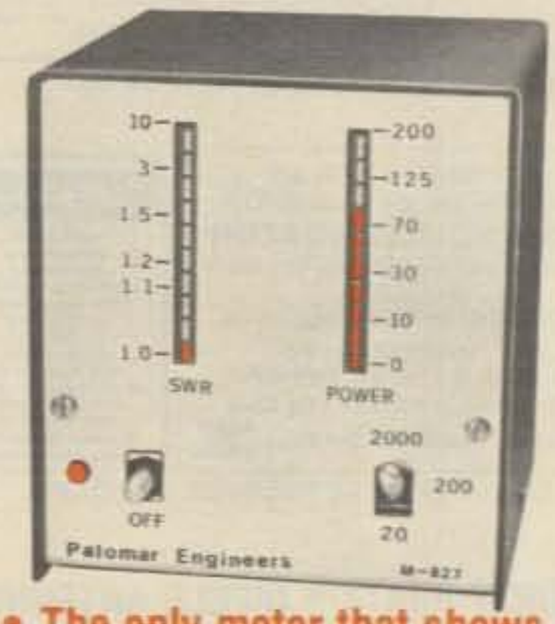

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The World System

CIRCLE 25 ON READER SERVICE CARD

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